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16 OCTOBER 1986

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

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WORLDWIDE REPORT

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DAYA BAY FACT-FINDING TEAMS RELEASE REPORT ON MISSION

Points Summarized

Hong Kong SOUTH CHINA MORNING POST in English 1 Sep 86 p 16

[Article by Albert Chan, Michelle Innis, Frank Choi, Wong Wing-hang, and C.K. Lau; first paragraph is SOUTH CHINA MORNING POST introduction]

[Text] The report by the Legislative Council fact-finding delegations on nuclear power was released on Saturday. Details and comments by Albert Chan, Michelle Innis, Frank Choi, Wong Wing-hang and C.K. Lau.

GENERAL OBSERVATIONS

ACCORDING to the information provided by France, the United States, Japan and the International Atomic Energy Agency experts during the fact-finding trips, the following observations are made:

(1) The pressurised water reactor (PWR), as is proposed for Daya Bay, is designed and will be constructed in such a way that even in the event of the worst accident resulting in a core meltdown, the containment building will be able to contain most of the radioactive products.

(2) The emergency planning required to be done to prepare for the worst accident will be:

(a) Possible evacuation within a radius of 10 km, adopted in France and Japan, or 16 km, as is required in the US.

(b) Contingency action on food and water to be taken within a radius of 50 km (80 km in US) from the nuclear plant.

(3) It is highly unlikely that an accident such as that of the Chernobyl RBMK nuclear power plant would happen to a PWR.

(4) An additional safety feature has been developed and adopted by France and other countries for modification of existing plants to reduce the build-up of pressure to a safe level, where necessary, inside the containment building in case of a severe accident. This is done by means of a controlled sand filter system, the usefulness of which is recognised by the IAEA.

(5) All improvements developed for control-room design as a result of the Three Mile Island accident have been incorporated in the design for the Daya Bay plant.

(6) The question of metal fatigue affecting the material used for the reactor pressure vessel has been resolved.

(7) The cost of nuclear power varies from country to country, and while in other countries the average cost of nuclear-generated power is cheaper than coal-fired generated power, in the US nuclear-generated power is more expensive than coal-fired generated power.

(8) The safety of a nuclear power plant depends to a great extent on safe operation by a well-trained operation crew. In France, the US and Japan, operators are licensed by the regulatory authority of the country. The operation crew undergo frequent periodical retraining to refresh them in emergency procedures to heighten their emergency response capability.

(9) In the US, near-site and off-site emergency response services centres are set up by the nuclear power companies to give technical support to the operation crew in case of emergency. A clear line of communication is set up and there is a clear chain of command to ensure that an emergency is handled properly.

(10) All nuclear power plants visited by the delegations are security-tight. Access and exit of all persons must be authorised and are computer-controlled and recorded. Site boundaries are monitored by closed-circuit cameras and stringent precautions are taken against sabotage.

(11) The relationship between utility companies, government and the public in the countries visited is very open. General information about nuclear energy and the design and operation and nuclear power plants is made easily available. The public

participate in public hearings [illegible] the plants and get involved in emergency planning.

Observations for the consideration of the Chinese Government and the Guangdong Nuclear Power Joint Venture Company

It has to be stated that it is recognised that the decision to build or not to build a nuclear power plant at Daya Bay lies within the jurisdiction of the Chinese Government, and we fully recognise the deep concern of the Hongkong people over the safety, management and operation aspects of the plant.

If a nuclear power plant is to be built at Daya Bay, the following observations are for the consideration of the Chinese Government and the Guangdong Nuclear Power Joint Venture Company (GNPJVC):

Design and Construction

(1) To incorporate the sand-filter system into the containmen; building design so as to increase further the safety features of the containment building at the highest level under a condition of high-pressure build-up.

(2) To incorporate a hydrogen recombiner system so as to reduce the probable danger of high-level hydrogen concentration, thereby avoiding the possibility of hydrogen combustion.

(3) To incorporate pressurised containment penetration design on to the penetration sleeves of those pipes that have to penetrate the containment building. The incorporation of this feature would help prevent any leak of air from inside the containment to other areas.

(4) To establish an emergency response facilities centre within site boundary but isolated from the plant, where technical support and command control can be given during an emergency.

(5) To ensure that the nuclear island (reactor building) is so constructed as to avoid contamination of underground water in case of a severe accident.

(6) To ensure, during construction stage, stringent quality control, and to make use of the IAEA Pre-Operational Safety Review Teams (Pr. OSART) visit to Daya Bay.

Accidents and emergency planning:

(1) To set up a national incident response headquarters to give support to the nuclear plants at Daya Bay and elsewhere in the event of incidents, and to consider direct access to the computer data links to be offered by Electricite de France (EdF).

(2) To establish an effective and independent communications system, including direct telephone lines and back-up facilities, for communication during emergencies between the Daya Bay plant, the Chinese nuclear safety authorities and the Hongkong Government.

(3) To use a single, consolidated instruction manual for plant operation, specifying clearly the chain of command and operational steps in the event of an accident or an emergency warranting a shutdown.

(4) To join the IAEA Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency.

(5) To draw up comprehensive and well co-ordinated emergency plans for the safety of the people living in the close vicinity (10 km by French standard, 16 km by the US standard, and 8-10 km by Japanese standard) of the Daya Bay plant.

(6) To enter cross-boundary agreements with Hongkong on the exchange of information and co-ordination of contingency planning.

Central Management

(1) To take up a further technical assistance contract with EdF after commissioning and during the life span of the Daya Bay plant.

(2) To delineate clearly the sphere of responsibilities between the government ministries and agencies for management and regulatory control of nuclear plants so as to ensure that there are checks and balances.

(3) To establish an independent advisory body for nuclear safety and nuclear regulatory control with Hongkong participation, and to draw on the knowledge and experience of experts from IAEA, France, US and Japan.

(4) To set up an independent inspectorate to inspect the nuclear plants to ensure that safety standards are maintained and safety regulations are enforced.

Plant management and training

(1) To provide for HLNJC's participation in the management of the Daya Bay plant for the life span of the plant.

(2) To develop a system of regular inspection and maintenance for the Daya Bay nuclear power plant to secure operational quality assurance.

(3) To institute regular training and retraining to heighten the operating crews' awareness of safety and preparedness for responding to emergencies (in the case of US, operators are required to attend a week of simulator room retraining for every four to six weeks of normal work).

(4) To make use of the IAEA Operational Safety Review Teams (OSART) visits to Daya Bay after commissioning.

(5) To work out and maintain tight security at Daya Bay for the protection of the plant and facilities from sabotage.

Environmental safety

(1) To set up a comprehensive and effective system of monitoring stations for monitoring radiation.

(2) To study the possibilities of atmospheric dispersion of radionuclides affecting the food chain and sources of water supply to the surrounding areas including Hongkong and draw up remedial measures if contamination occurs.

(3) To draw on the knowledge and experience for disposal of nuclear waste from such countries as France, US and Japan which have done advanced research into this problem.

International arrangements

(1) To make the most of all IAEA assistance in training, inspection mission, and regulatory advice, and adopting, to start with, the IAEA safety requirements criteria as set out in the Nuclear Safety Standards (NUSS).

Public education and information

(1) To urge the GNPJVC to play an active role, as in the case of utility companies in France, US and Japan, in educating the public about nuclear energy in general and the Daya Bay plant in particular.

(2) To require Framatome to explain to the public the design of the Daya Bay plant, and how the safety features could counter the maximum credible accidents.

(3) To make available as much information as possible to the Hongkong public about the construction, quality, and precautions taken for the plant; and to set up a public inquiry bureau to facilitate better understanding.

(4) To make public the safety analysis reports prepared by EdF when it is completed.

Economic aspects

The economic efficiency of nuclear power is multifactoral, and varies from country to country, and we cannot make an assessment on whether there are economic benefits to China in building the Daya Bay nuclear power plant or not. Nevertheless, we wish to ensure that the future electricity tariff being charged to the people of Hongkong will not be higher than the tariff charged by the Hongkong power companies for the life span of the Daya Bay nuclear power plant.

Observations for the consideration of the Hongkong Government and the Hongkong Nuclear Investment Company

The following observations are for the consideration of the Hongkong Government and the Hongkong Nuclear Investment Company (HKNIC).

Contingency planning

(1) A contingency plan should be drawn up for those areas which lie within 50 km (80 km by US standard) of the Daya Bay plant for protective measures in the event of radiological releases affecting Hongkong.

(2) Protective measures should be planned against the contamination of water supply, vegetables and other food and dairy products.

(3) A government committee should be set up for the preparation of contingency plans.

Cross boundary agreement

(1) Cross boundary agreement should be made with China to enable Hongkong to monitor radioactivity at a close range to the Daya Bay plant, to exchange information and to co-ordinate contingency planning for Hongkong.

Public information

(1) The Hongkong Government should strengthen its public information program to make available information about nuclear energy and the effects of radiation.

(2) The HKNIC and China Light and Power should introduce a public information program and disseminate to the public information with regard to nuclear power. An information bureau should be set up to answer questions from the public.

Advisory committee

(1) The Hongkong Government should set up an independent advisory committee to advise on matters related to nuclear energy.

IAEA membership

(1) To establish international links with nuclear safety agencies, and to obtain information and advice on nuclear safety, the Hongkong Government should consider Hongkong membership with the IAEA.

Atomic Industry Forum membership

(2) HKNIC should consider joining the Atomic Industry Forum, which is a US nationwide as well as an international organisation, to obtain information exchange on, and technical support for, the nuclear industry.

Immediate Effects Envisioned

Hong Kong SOUTH CHINA MORNING POST in English 1 Sep 86 p 16

[Text]

THERE would be no deaths in Hongkong within 10 hours of an accident at Daya Bay even if winds were blowing towards the territory.

The immediate consequences for Hongkong would be in terms of crops, water and open sea contamination rather than human lives, according to a recently released US study on nuclear research.

Councillors who went on a fact-finding mission to the United States reported that the US Nuclear Regulatory Research group had released the results of a HK$300 million five-year study on the latest research into severe nuclear accidents.

The study, published in July, covered the pressurised water reactors operating in the US which have design features similar to the French model planned for Daya Bay.

An official on the research told the delegation that the effects of a nuclear accident at the Daya Bay site would greatly depend on the specifics of any mishap.

However the official said that if Daya Bay had no containment building or if the containment failed, a two to three-square-foot crack would allow all fission products to escape.

The official said the Daya Bay containment building was required to withstand pressure four to five millibars higher than normal but would probably withstand stresses up to three times higher than the safety requirements.

If a severe accident happened and nothing was done to stabilise the situation, it would take 10 to 30 hours for a sequence of events to take place that would lead to a containment failure.

Because of construction safety margins over and above design requirements, it was possible to have up to 100 hours for corrective action to be taken before the containment structure failed.

When asked if any type of accident would make the containment structure designed for Daya Bay fail, the official said that the chance of such a mishap was "very small."

The official noted there had been two to three incidents in the United States in which the pre-stressed concrete walls of the containment building had allowed slow leakage with no structural damage.

In all likelihood, the official suggested, the containment would be strong enough to withstand the most severe accident.

French Program Praised

Hong Kong SOUTH CHINA MORNING POST in English 1 Sep 86 p 16

[Text]

THE public should have better access to information about nuclear energy and radiation, say the reports by the Legislative Council teams.

The reports say the Hongkong Government should strengthen its public information program to include information about nuclear energy and the effects of radiation.

It said the Hongkong Nuclear Investment Company and the China Light and Power Company should introduce a public information program, and an information bureau should be set up.

The Legco team to France reported that public meetings were held by the utility company, EdF, which included giving details of the potential risk from nuclear power.

During the construction stage, locals were invited to tour the construction site.

"We feel that the openness of the utility company and the French Government has cultivated a feeling among the locals that the utility company is trustworthy and genuinely contrives to operate and maintain efficient and safe nuclear power plants," the Legco report on France said.

Councillors said in each power plant they visited, there was a public information centre in the vicinity.

Said the report: "We believe the public's confidence in the nuclear power plants in France is not only inspired by their participation in the project and the openness of the utility company, but is also due to the fact that the local officials and representatives and the public have a fair understanding of the action to take in the case of an emergency.

"After commissioning, plant managers continue to inform the local inhabitants, especially the mayor, on any incidents that took place in the plant and EdF newsletters will publish such occurrences."

A copy of the emergency plan is deposited at the town hall for public inspection and pamphlets explaining the precautions to be taken by the public within the emergency zones are distributed.

The Legco report praised the part the French Government took in securing public confidence in the nuclear energy program.

Said the report: "The various regulatory bodies have strived to maintain an independent image. The sharing of responsibility and authority among different ministries also serves to provide the much needed checks and balance. The utility company is obliged to answer to the satisfaction of the authorities every question put to them at the public hearing.

"Although there is no avenue of appeal against the Government's decision on the issuance of authorisation licence, a nuclear plant cannot be built if the majority of the local inhabitants object to it."

The Legco team said there was no formal education program in French schools to specifically educate students on the subject of nuclear energy.

In Austria, where the anti-nuclear movement is stronger than France, the Government was defeated on a 1978 referendum on the construction of its first nuclear plant by 50.1 per cent to 49.9 per cent.

In Japan, the team was told by local officials that the Japanese Government was sensitive to public feelings about nuclear power because of the atomic bombs dropped on the country during World War II.

The Government stresses the safety aspects of nuclear development and appeals for the public's understanding and support.

The subject is not covered by the school curriculum but general education programs and public information about nuclear safety is displayed on television and in newspapers and magazines.

The Government also employs market researchers to conduct surveys on public

opinions and feelings. Public opinion is monitored by the Atomic Energy Commission.

The Tokyo Electric Company's nuclear power plant provides information to the public during construction and operation of the plant.

The prefecture government also makes sure that adequate publicity is given. Information released includes the quantity of release from the plant, and radioactivity in soil and water.

The company quickly gave out information about the Chernobyl accident, and a pamphlet explained the difference between the Chernobyl-type reactor and the boiling water reactor.

The team was also told by officials that anti-nuclear movements in Japan were rather scattered. People generally accepted that the trend of the nuclear industry was healthy, but the Socialist Party of Japan was a strong opponent of nuclear power.

"But we are told that even within this party, the opposition to nuclear development decreased from 70 per cent to an estimated 50 per cent right now.

"This therefore gives a rather optimistic outlook for the Government to continue to pursue its policy for developing nuclear energy," the team reported.

In the United States the Legco team observed that information on nuclear power generation was easily available.

There is no formal curriculum in schools on the subject, but both utility companies and federal agencies make available brochures, films and visit to plants.

Federal rules, regulations and orders are deposited in public document centres for inspection and research items are invariably made available for public comment before they are finalised.

The Legco team was in the United States after the Chernobyl accident and as the Three Mile Island No 1 Unit re-started after a scheduled shutdown.

The population around Shoreham were putting up strong resistance against the licensing of the plant for operation, and there were sporadic demonstrations, such as one at the Zion plant near Chicago.

The team met the Natural Resources Defence Council, a non-government organisation funded by private donations devoted to the preservation of natural resources.

The council, which has been kept informed of the development of nuclear energy in China, believes good management depends on strong regulatory capability, such as that in the United States.

The amount of money China spends on training and on setting up a regulatory body will have an important bearing, the council said.

They said arrangements would have to be made by Hongkong with China for contingency planning, monitoring of radiological release, exchange of information, and assistance in emergency relief in the event of an accident.

The emphasis, they said, would be on minimising risks, and Hongkong should make as many demands on China as possible.

The Legco team which visited Harrisburg visited the spokesman for the "Three Mile Island Alert," one of the groups fighting against the re-starting of the Three Mile Island No 1 Unit.

The group challenged the management integrity of the utility company, citing the conviction of plant personnel for falsifying monitoring information before the plant's Unit 2 accident.

The group said the amount of radiological release was unknown because it was based on measurements taken by government and the company alone, without any independent monitoring.

Equipment Problems Feared

Hong Kong SOUTH CHINA MORNING POST in English 1 Sep 86 p 16

[Text]

ONE OF the worries critics have cited about the Daya Bay plant is the possible problem of a combination of British and French equipment.

In France, both the reactors are manufactured by Framatome while the generators are from Alsthom.

While it is a fact that the British GEC group has never produced the exact type of generators to be installed at Daya Bay, the combination of equipment from different companies "does not cause any significant interface problem in assembly and operation," the US delegation was told.

Individual officials of the Nuclear Regulatory Commission told the Legco delegates that they believed the French safety standards, although comparable to the American, were more stringent.

This is because in France, nuclear reactors are manufactured by one company (Framatome) and operated by one utility (Electricite de France). Therefore, requirements are standardised.

In Japan, the Legco delegation was impressed by the country's nuclear safety research and development.

The delegation visited a research centre of the Japan Energy Research Institute at Tokai which was set up in 1956.

Research programs were launched at considerable cost to study reactor safety, accidents caused by loss of coolant, nuclear fuel cycle safety, environmental safety, nuclear waste disposal and so on.

The Japanese, however, conclude that all containments are safe so far and do not attach too much importance to the sand filter feature now being adopted in France and under study by the Americans.

[illegible]

Hong Kong SOUTH CHINA MORNING POST in English [illegible]

[Text] Accidents

THE Legco missions to Europe, the United States and Japan pointed out that all nuclear countries recognised the inevitable risk of human error when drawing up safety plans.

"Fundamental to the nuclear industry's approach to safety is the recognition that no human enterprise can be entirely risk-free," the councillors said.

They felt nuclear power development should therefore be accompanied by a parallel awareness of the need for strict standards and regulations governing design, construction, operation and maintenance to ensure the health and safety of plant workers and the public.

After meetings with overseas nuclear experts from Europe, the United States and Japan, in addition to officials from the International Atomic Energy Agency, Legco members said stringent requirements on safety standards and regulations would provide the primary level of protection against the consequences of a nuclear plant accident.

The report suggested establishing a national accident response headquarters in China which could give support to the Daya Bay plant and elsewhere in the event of accidents.

Access

The report also suggested setting up direct access to the computer data links to be offered by the Electricite de France.

The Umelco delegations placed it as a top priority after studying facts about nuclear accidents and contingency planning. The following were some of their findings.

IN EUROPE

The delegation accepted that nuclear installations like all industrial facilities were subject to incidents and accidents, and the objective of nuclear safety was to reduce accident probabilities and limit their consequences.

The safety analysis of nuclear plants is normally based on the "defence-in-depth" concept, which defines three levels of safety that characterise the design of light water reactors, from when the plant starts to operate commercially.

- First level: maximum inherent ability of the plant to function safely during normal operation through design and quality of fabrication.
- Second level: incorporation of protection systems capable of minimising the effects of abnormal transients or incident events.
- Incorporation of engineered safety features capable of mitigating the effects of postulated accidents.

On emergency planning, the primary level will concentrate on maintaining high standards and strict regulations on structural design for protection against the consequences of nuclear mishap and the second level concerns protection from radiation.

The planning must aim at limiting the immediate dose associated with the passage of a radioactive plume and the longer-term ingestion dose via the agricultural and water pathways in the event of an accidental release of radioactive materials to the environment.

Adequate emergency planning and preparedness arrangements should include:

- Emergency plans that specify precise and consistent response action.
- Review, approval and testing of such plans by the regulatory authorities.
- Close co-ordination between nuclear power plant operators and public authorities.
- Off-site emergency plans based upon a technical assessment of the various categories of accidents that could occur.
- Establishment of emergency planning zones based on realistic dose protections for implementing the appropriate off-site protective measures.

IAEA nuclear experts in Vienna told the delegation emergency plans should be designed to take specific account of the type of facility and to deal with a wide spectrum of possible accidents rather than a single reference accident.

The essential feature of the plans was to present a flexible framework for action and enable details of the action to be made specific to the particular accident event sequence.

Emergency planning arrangements should be completed sufficiently in advance of plant commissioning, and preferably before fuel loading starts, to allow adequate training and exercising of personnel in their emergency duties.

IAEA officials also told the delegation that most countries had two emergency plan zones — areas within 10 km radius and those outside the 10 km radius.

THE UNITED STATES

The delegation found the Three Mile Island incident report to the President's Commission made reference to 40 accidents that had occurred in nuclear reactor facilities worldwide.

Out of the total, 22 resulted from equipment failure, 10 from human failure and seven involved both.

Following the Three Mile Island incident, US nuclear authorities accepted 81 items of improvements on nuclear energy production covering the following aspects:

- Upgrading of reactor operator and senior reactor operator training and qualifications.
- Overhauling of regulatory practice and procedures.
- Increased and improved technical communications.
- Improved emergency communications.
- Modification based on the human engineering of controls and [illegible] control rooms.
- Installation of more instruments to monitor reactor system condition.
- Installation of new facilities such as radiation monitoring and water level instruments in the containment buildings to better prepare them for emergencies.

The United States' Federal Regulations also laid down a standard emergency classification and action level system for accidents based on facility system and effluent parameters adopted by the nuclear facility licensee.

Unusual

Four classes of emergency action levels are established:

- Unusual Event — Specific situation recognised as creating hazard potential not previously existing. No release of radioactive fission products but must be reported to Nuclear Regulatory Commission's (NRC) Incident Response Centre.
- Alert — Event with potential or actual substantial lowering of safety level of the plant. There may be radiological releases up to one rem (whole body) off-site.
- Site Area Emergency — Events involving major failures of plant functions needed for the protection of the public. Off-site dose may be up to five rem.
- General Emergency — Events in the reactor involving imminent or actual substantial core degradation or core melting. Off-site doses may be greater than five rem; protective measures of population and environment are necessary.

In response to nuclear accidents the United States has set up NRC Incident Response Centre with its headquarters in Bethesda, Maryland, and is manned 24 hours a day by staff who are technically qualified to deal with emergency reports.

IN JAPAN

Every year Japan holds its drills for emergency response teams as the day for prevention of nuclear disasters.

The drills involving mainly Government agencies and utilities employees aim to check that the communication network between agencies is in order.

There have been no serious nuclear failures or accidents throughout Japan's 30-year history of nuclear development.

In 1984, there were 18 minor failures and incidents with an average rate of incidents per reactor at the lowest since 1978, when the operation rate of nuclear power plants recorded the highest-ever rate of 73.4 per cent.

The number of Japanese plants which closed because of breakdowns averaged 0.1 per year, one-digit less than the United States and other countries.

In Japan, a law requires that the central Government, local governments and power utilities work together to draw up emergency plans for accidents in a nuclear power plant.

Statistics on Risks

Hong Kong SOUTH CHINA MORNING POST in English 1 Sep 86 p 17

[Text] Environment

COALMINERS face a much higher risk of dying as a result of their work than staff who manufacture electricity using nuclear energy, according to the Legislative councillors' report.

The report, which sets out comparative risks and then calculates loss of life expectancy, reveals that a coalminer will lose 1,100 days from his life while a radiation worker will lose only 12.

The statistics, from University of Pittsburgh professor of physics, Dr Bernard Cohen, also claim that people who smoke one packet of cigarettes a day will lose 1,600 days off their life expectancy, while those who spend their entire life near a nuclear power plant will lose just 0.4 of a day.

The councillors' fact-finding missions collected information on the harmful affects radiation could have on health and the environment, from the United States, Europe and Japan.

Although some information from the three countries conflicts, there is little criticism of the affects radiation exposure might have on the environment.

US authorities even say that aquatic life around one turbine plant has improved because high temperatures discharged from the plant have warmed surrounding water temperatures.

And Japanese authorities say although people exposed to extreme levels of radiation may develop leukaemia there is no link between radiation and cancer.

A report from Europe says nuclear power stations certainly involve no more risk – in fact are probably less of a risk – to the community than oil or coal burning systems.

"Two hundred tonnes of uranium fuel are required to operate a 1,000-mw power plant using a light-water reactor for one year, generating sufficient electricity to supply a town of one million people," the European experts said.

"A fossil-fuelled (oil or coal) plant of this capacity burns about two million tonnes of anthracite coal, or nine million barrels of oil, a year."

The three reports reveal there is no international standard on the limit of radiation to which a person can safely be exposed.

During normal operation of a nuclear plant, United States authorities set exposure limits to 25 millirem per person per year.

In Japan however, the safety level of radioactivity for the public is set at 500 millirem a year, but the level of additional radiation given out by a nuclear power plant to the surrounding area can not be above five millirem per year.

The Tokyo Electric Company told Hongkong's Legislative councillors that during the first few years of operation, there was some leakage of low level radioactive material from a number of nuclear power plants.

"But since then the radioactivity around the plants has been so low that it could not be detected," the report says.

All countries surveyed by the Legislative councillors have sophisticated monitoring systems – with radiation detectors located on the nuclear power station sites and in surrounding districts.

But all face the common problem of waste disposal.

While the US has solved the technical issue of waste disposal, there has been no solution found to the political issue of where the waste should be stored, according to the report.

Low-level waste, such as contaminated clothes, gloves, boots and other items used in the nuclear power station, are stored in special containers buried underground.

But there is an inter-state controversy as to where high-level radioactive waste should be stored.

Three storage spaces have already been selected by the federal authorities but the states concerned have refused to accept the high-level radiation waste.

Safety Measures Discussed

Hong Kong SOUTH CHINA MORNING POST in English 1 Sep 86 p 17

[Text] Safety

IN the discussion on safety, the critical question in the minds of the visiting Legislative Council members is whether the containment building of a reactor can be destroyed in the worst accident scenario thus leading to a large release of radioactivity.

Experts in France, Austria, the United States and Japan are unanimous in their views that the integrity of a Pressurised Water Reactor (PWR) containment is difficult to challenge.

This safety feature also makes the Chernobyl type of accident very unlikely to occur at a PWR plant.

Mr M. Rosen, safety director of the International Atomic Energy Agency, added that it was hard to visualise a containment release in a water reactor.

The reactor building of the Chernobyl nuclear power plant was not designed for containment purposes.

Moreover experiments carried out in France have shown that even if cracks were to appear on the containment wall due to sustained presure build-up beyond 12 bars within the containment, the crack would act as a filter which would greatly reduce the volume of radioactive release.

The containment wall would then seal itself off after the release of pressure from within the containment due to the characteristics of prestressed concrete.

The French also told the delegation that a sand filter system would be able to limit the amount of radioactive substance released in case of an accident.

This system allows a release of pressure under controlled conditions to bring the pressure inside the containment building down to the safety limit.

The radioactive gas released will then pass through the sand-filter system before going out into the atmosphere.

The usefulness of this system was confirmed by Mr Rosen.

(This additional feature, however, was not included in the Daya Bay contract, but the French said the Chinese could choose to include it later).

In Japan, the delegates were told that the Japanese had no intention of putting this feature into their reactors because they considered their containment strong enough.

In the US, Mr Donald McPherson of the Department of Energy said that a Chernobyl-type accident "could not" occur in a PWR plant.

The US delegation was also told that the Western-type water reactor was a stable system because it used water rather than graphite as coolant.

Graphite can be ignited – water cannot.

The US discussion was heavily dominated by the much-publicised Three Mile Island accident of 1979.

During the accident, the average dose of radioactive release was less than eight millirem to the population within 16 km of the plant.

This was a very low level of radiation compared with the normal background radiation of around 100 millirem.

The US experts said the accident showed the effectiveness of the threefold security of the water reactor.

Nevertheless, much research was done on the safety aspects of nuclear plants following the accident.

One design philosophy in nuclear power plants is "defence in depth" which is stressed by both the French and the Americans.

This philosophy simply means the plant has to be designed with the assumption that everything within reason goes wrong at once – including mechanical failure, loss of electricity supply, human error etc – yet there is still a backup system to prevent disaster.

The Legco report quoted Dr Bernard Cohen's book *Before It's Too Late – A Scientist's Case for Nuclear Energy*: "One sometimes hears statements to the effect that reactors are safe if everything goes right but if any piece of equipment fails or if an operator makes a mistake, disaster will result.

"This statement is absolutely wrong. In reactor design, it is assumed that all sorts of things will go wrong – pipes will break, valves will stick, motors will fail, operators will push the wrong button etc, but there is 'defence in depth' to cover these malfunctions or series of malfunctions."

Staff Already Training

Hong Kong SOUTH CHINA MORNING POST in English 1 Sep 86 p 17

[Text] Training

CHINESE personnel are already working in the US Nuclear Research Centre to gain experience in nuclear reactor safety matters in preparation for Daya Bay, Legco's fact-finding mission to the US was told.

And the mission to Europe learned that staff operating the Daya Bay plant would receive the same training as those working in French nuclear stations.

The councillors' report on their overseas trips also reveals that the training and retraining of staff operating nuclear plants had been given very high priority in every country visited.

In France, the Legco mission was told: "Without a team of competent staff, no nuclear power plant, even those with the best design in the world, can be operated safely."

Various teaching aids – including machines which simulate 800 different accident scenarios – are used in French training programmes.

For one week each year staff also undergo refresher courses during which they are updated on recent incidents and developments concerning nuclear power.

French engineers told the Legco mission that the Chinese engineers they had worked with, were highly perceptive and had had no problem grasping the theories of nuclear power regulation, but added that they did need more on-the-job experience.

Potential staff for Daya Bay are to receive the first part of their training in China. Then 113 of them will go to Europe, mainly France, to complete training.

In addition, the French authorities will produce training programs for each function at the Daya Bay plant and provide suitable teaching aids.

One such aid will be a replica of the power plant's control room which is to be installed at the Daya Bay site for training purposes.

Chinese staff trained in France will undergo refresher courses in China.

The Legco mission to the US learned that nuclear plant operators underwent more frequent re-training there than in Europe. Most plants gave workers one week's retraining every four to six weeks.

The mission was told that Chinese personnel would participate in staff training courses in the US and work within training centres there to gain experience.

Secrecy Not Justified

Hong Kong SOUTH CHINA MORNING POST in English 1 Sep 86 p 14

[Editorial: "New Debate Needed on Daya Bay Project"]

[Text]

THE report by the Legislative Council's fact-finding missions overseas on nuclear power were presented at the weekend, and several conclusions emerge from a first reading. The compilers of the report appear to assume that it is a foregone conclusion the Daya Bay plant will be built; they could make no sensible assessment of the economics of the plant except to request reassurance that Hongkong would not be charged excessive tariffs for power; that they had some reservations about plant management and safety which led to a number of reasonable recommendations ("observations", rather, so as not to upset Chinese susceptibilities) as to safety, monitoring, regulation and contingency plans. One of the "observations" takes up the suggestion this newspaper made some time ago that an independent advisory body with responsibility for safety and regulatory control of Daya Bay be set up with Hongkong participation.

So far, so good. The report is a safe, sensible document, and it is of limited value. It does little to answer some of the fundamental questions raised by the people of Hongkong. It adds not very much to the public debate about the safety and future maintenance of the plant, and absolutely nothing to the public's understanding of the economic justification for Daya Bay. By backing the Government line that the decision to build the plant is a matter for China, it is unlikely to encourage Beijing to take into account the concerns of Hongkong. The public worry about

Daya Bay is linked to doubts as to the extent China will recognise the legitimate concerns of the Hongkong people, or take public opinion into account, when this city becomes part of China after 1997.

Lost in the debate seems to be the fact that the idea for Daya Bay originated from Hongkong, that the power it generates will be sold to Hongkong, that the project has the backing of the Hongkong government and one of the territory's major hongs, and that if it had not been for Hongkong's active interest and support, the project would never have got this far. There is still serious debate in Beijing about future energy requirements and the direction the country's energy policy will take, but of course, now that politics has entered the fray, the matter is more complicated. On the one hand, the people of Hongkong have used Daya Bay as a symbol of protest about decisions over which they have had no control, and the depth of their concern is shown by the opinion polls and petitions with a million signatures; on the other hand, face for China is now involved and it cannot be expected to react kindly to outsiders telling it what it can or cannot do. Of these two conflicting demands, it is not difficult to predict which will win out. Thus have economics and politics intertwined to complicate what began as a safety issue. It is much more, and if it is treated solely as a nuclear safety matter, any debate is misdirected.

Attention would be better focused on not what should be done, but how. Will it be done with style, with some concessions to the concerns of Hongkong, or will it be bulldozed through as it had been until Chernobyl changed the face of nuclear power forever? The prognosis is not encouraging. Much obfuscation has gone on over Daya Bay. The public is a little better informed now, but there are still several areas where it has been kept in the dark. The confidential risk assessment report prepared by the United Kingdom Atomic Energy Authority at the request of the Hongkong Government, published by this newspaper last month, revealed a degree of inadequacy which prompted some government alarm. At the time the flawed report was received, it was reassuring the public that all was well. The Lazard Bros study on the economics of the project is still secret, and the Legislative Councillors when compiling the public relations handouts they had collected did not feel able to address this vital question. Economically, is Daya Bay good for Hongkong or not? We simply do not know.

So where do we go now? Mr Martin Lee's request for another special debate by the Legislative Council seems perfectly reasonable. Surely the whole object of the overseas missions was to gather information for public discussion and debate. Questions still remain to be answered, matters need to be aired. Now the report has been prepared, and with the signing of the contracts only weeks away, it is time to bring the issue into the public arena again. It was clearly understood that further consideration would be given to it when the report was finalised, yet so far the Government has turned down Mr Lee's request. He is now expected to try to force a debate at the "in house" meeting of Legislative Council members on Wednesday. It is difficult to understand the Government's reluctance: some may come to the conclusion that it still has something to hide. The best way to dispell that is for the whole matter to be opened to discussion. Secrecy is not justified on a matter of such intense public interest.

Analysis by Albert Chan

Hong Kong SOUTH CHINA MORNING POST in English 1 Sep 86 pp 1, 2

[Article by Albert Chan: "Piles of Much Needed Detail--Six Years Late"]

[Text] The 213-page report on the Legislative Council's nuclear fact-finding trip may be dismissed as a public relations exercise for the pro-nuclear camp, but sadly it has taken six long years for the people of Hongkong to be given such a detailed document about the nuclear energy issue.

Hongkong was told about the Daya Bay project as early as 1980 when China Light and Power Company disclosed that it was conducting a feasibility study with the Chinese authorities.

For China Light's chairman Lord Kadoorie, nuclear power was the answer to Hongkong's burgeoning demand for electricity. For China, construction of the plant was an answer to its thirst for Western technology.

Six years have passed and the shadow of Chernobyl is hanging over the nuclear industry and only now, within weeks of the contracts being signed for construction of Daya Bay, is a fairly detailed document on aspects of nuclear energy available to the people of Hongkong.

The Legco document makes important observations about safety aspects, possible accidents and remedies, emergency planning, public education on nuclear power plants, and so on.

It says nuclear accidents can happen, but attempts to substantiate with technical proof that a disaster of the kind which devastated Chernobyl cannot happen at Daya Bay.

Such specific information might never have been made available had it not been for Chernobyl which spurred Legco members to action--such an analysis was not made available by the Chinese Government, the Hongkong Government or China Light and Power.

The Hongkong utility and its Chinese partner, which now operates as the Guangdong Nuclear Power Joint Venture Company, have probably had for years most, if not all, the information collected by the Unofficials [as published] in France and Austria.

Why did they not take a more positive approach and release the information the public sought?

A large part of the Legco report comes straight from the brochures provided by the various organisations the delegations visited.

Most of these brochures were readily available to the public in the respective countries.

What about the people of Hongkong and China

A top official at the joint venture company admitted that China was a long way behind Western nuclear nations in public education on the issue, and one can only wish the Chinese authorities can do a bit of catching up now that the nuclear stations in Qinshan near Shanghai and Daya Bay are well under way.

As for Hongkong, both the Government and China Light and Power had for years insisted that the plant was to be built in China and that as the Chinese had a majority (75 per cent) stake in it, it would be "inappropriate" to come forward as a kind of spokesman on the project.

However, the fact remains that a Hongkong company is in the joint venture and that Daya Bay is 50 km from the heart of the territory and its six million inhabitants. Hongkong and its people have a right to comment.

In France, the United States and Japan, the case was different.

The public relations work of the French, in particular, must be commended. Information on the projects, the risks and possible problems were discussed in public inquiries before plants were built.

Even in Britain, a public education program was launched years ago to demystify the subject although it is arguable whether British authorities have been successful in explaining to their people about nuclear energy.

The report compiled by the United Kingdom Atomic Energy Authority for the Hongkong Government on public education recommended that the earlier the education program begins, the better.

The report reached the Government last year. Nothing was done. Then came the Chernobyl disaster and everything changed.

The Government now says it is reconsidering the whole strategy of public education in the light of Chernobyl which has dealt a severe blow to public confidence and perception of the issue.

CLP is now re-structuring its public relations machinery and even the joint venture company is working to set up a PR department to be headed by a mainland Chinese.

These are belated moves.

As for the Legco report, the speed in completing it in less than three weeks should be praised, the large number of spelling and grammatical errors is evidence of the pressure faced by those working on it.

Nevertheless, it must be pointed out that the report, especially the part on the visits to the US and Japan was written with an unmistakable bias against anti-nuclear views.

Part four of the report which deals with Japan says "A public survey once conducted by the Prime Minister's Office showed that 70 per cent of the people supported nuclear power development in Japan but the press claimed a different outcome using their own surveys."

The use of the word "claim" and the failure to mention the results of the surveys conducted by the press gave the average reader an unfair impression that the press polls are less credible than the official ones.

The delegation also failed to say when the official poll was conducted (probably before Chernobyl) and this again could mislead the reader.

Leader of the delegation Mr Allen Lee told Hongkong reporters in Tokyo about the official poll and this was widely reported. The next day, the *South China Morning Post* reported that a survey following Chernobyl by *Mainichi Shimbun* found that 70 per cent were against nuclear energy.

This was further supported by a survey by another top Japanese newspaper, *Asahi Shimbun* which released its results on Friday. It found that 34 per cent of the 2,300 people interviewed supported the nuclear option.

This may be a minor interlude to the Legco trip but it did add weight to the claim that Legco members were spending public money to be spoon-fed by the nuclear industry and governments supporting nuclear energy – perhaps with the exception of Austria.

Much of the report details claims of the designers, builders and operators of nuclear plants about the improbability of accidents and plays up the safety procedures and mechanisms they have installed.

Nevertheless, one important observation deals with the necessity of well-planned emergency procedures in the event of a nuclear accident at the plant.

Thus the more serious question is how critically should we read the safety claims given to the delegations and printed in their report.

The part on the US trip which deals with meeting the anti-nuclear group called Three Mile Island Alert (TMIA), was fairly critical of the anti-nuclear views.

The report quoted an elected commissioner of a county near the Three Mile Island area who said there was a referendum in the county in which 70 per cent of votes cast were against the damaged TMI reactor restarting.

The report added, "We understood however that the referendum was non-mandatory and that the turnout at that referendum was only 10 per cent of the population."

During an interview with a housewife who lived near TMI when the accident occurred, the delegation was told that her child had felt sick at school during the day of the accident and she was still anxious about possible delayed effects.

The report added that she could not recall whether any other children at the same school had felt sick or shown any abnormal symtoms.

The woman told the delegation she would not leave and live further away because she did not want to leave her home town.

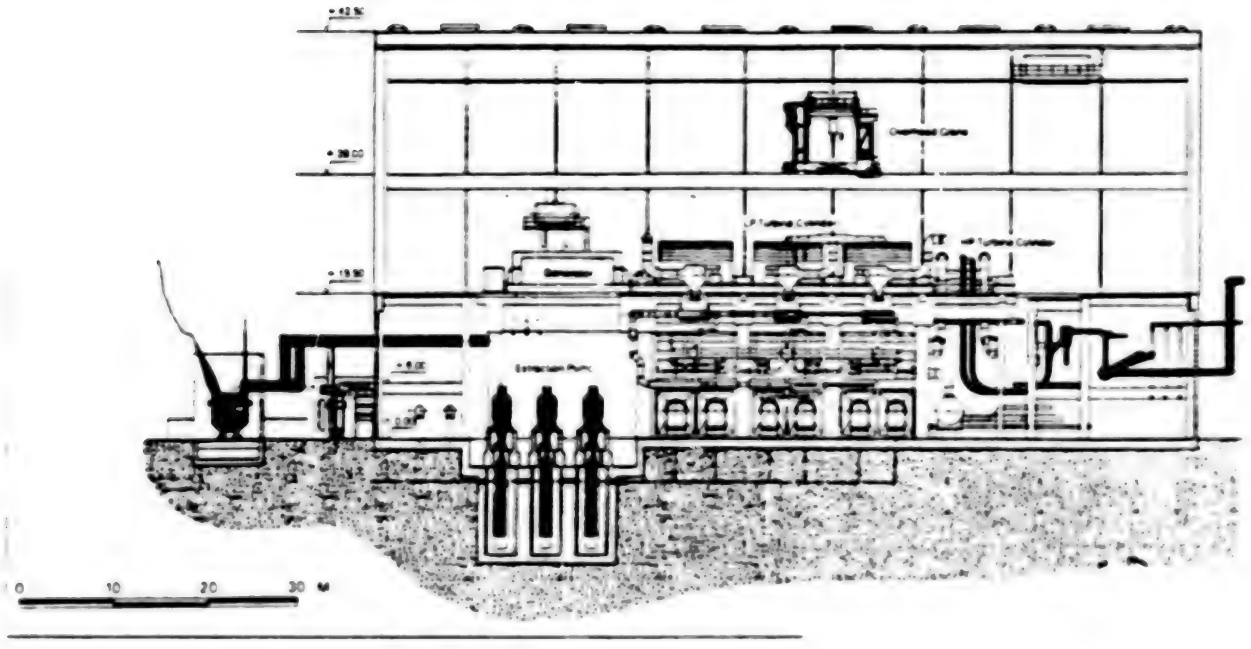
Such comments show that the Legco delegates were critical of the claims made by anti-nuclear groups or individuals but were they equally critical – or rather did they have the expertise to be critical – of the claims about safety and technical specifications made by the pro-nuclear faction?

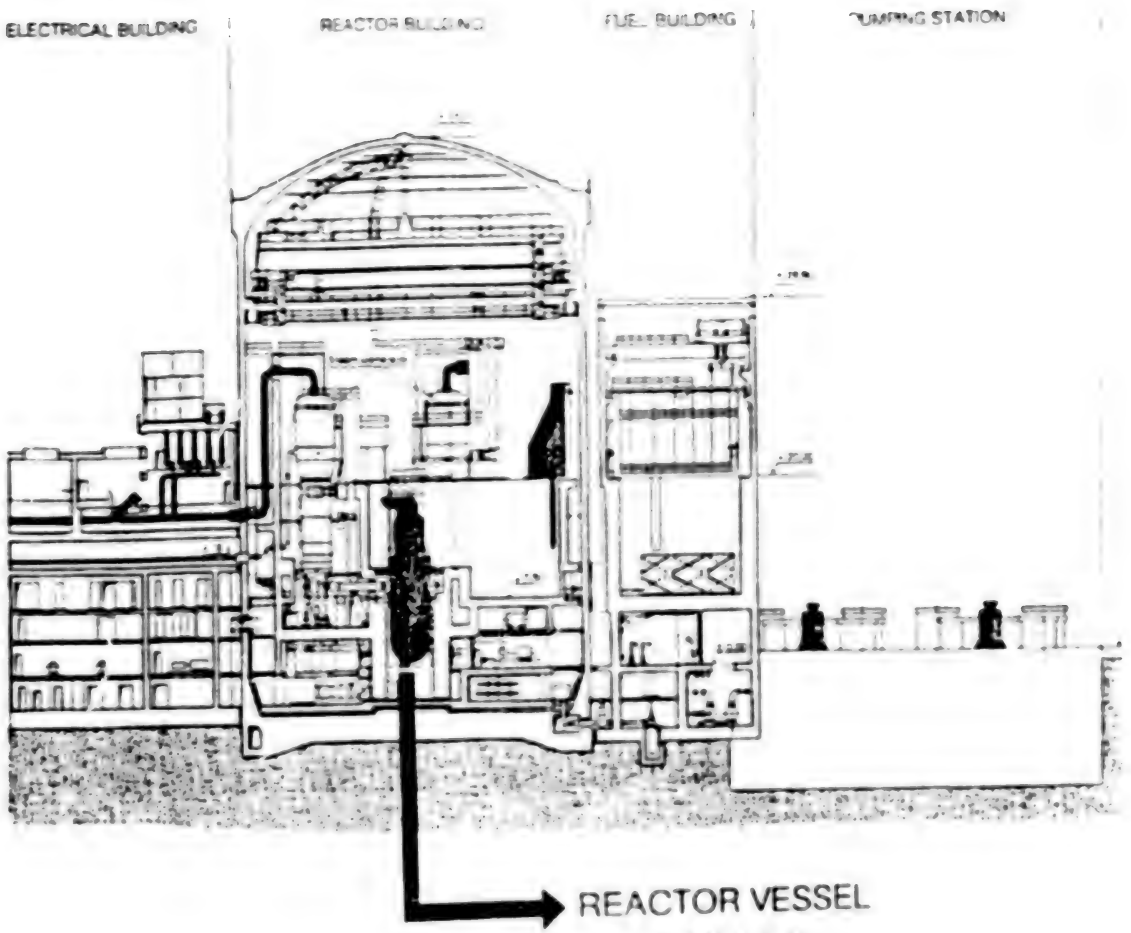
The report is persuasive – it leaves an unmistakable impression on the reader that Daya Bay will be built and that it will be safe. However, it must be read cautiously, in critical perspective.

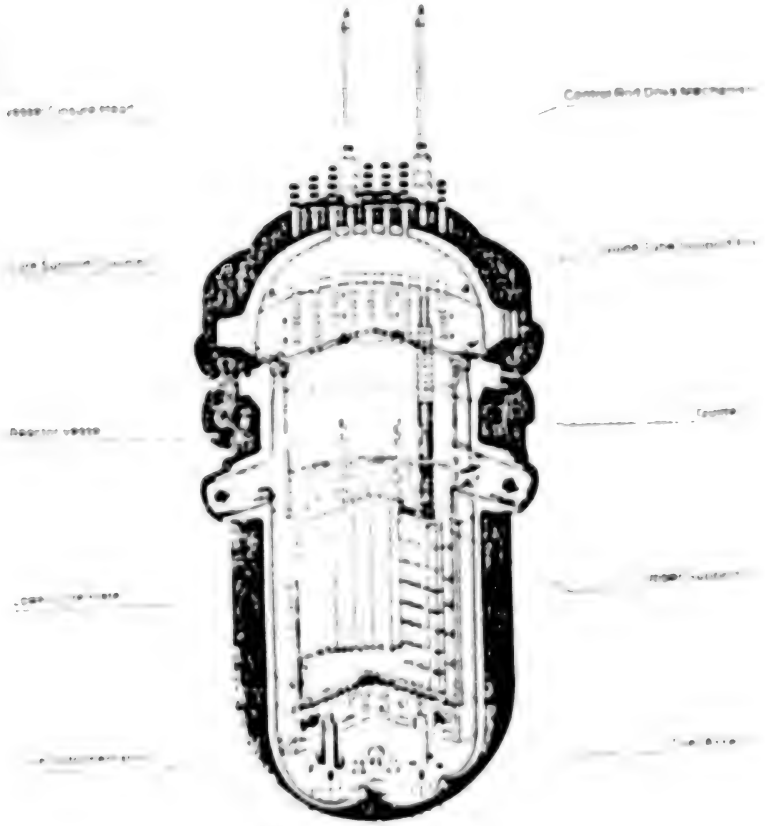
A cross section of a typical French nuclear power plant similar to the one that is to be built at Dava Bay. Below is an enlargement of the reactor vessel

MAIN TRANSFORMER PLATFORM

TURBINE HALL







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REPORTAGE ON ANTINUCLEAR LOBBYISTS' PRC VISIT

Official Receives Protest

Hong Kong SOUTH CHINA MORNING POST in English 21 Aug 86 p 9

[Article by Albert Chan]

[Text]

THE stalemate between militant anti-nuclear lobbyists from Hongkong and their Chinese hosts in Beijing was broken yesterday when Mr Li Hou, the second most senior official in the Hongkong and Macau Affairs Office, met the protestors.

He accepted their petition with over one million names on it calling for the scrapping of the Daya Bay nuclear plant.

The breakthrough came despite blunders made by the Hongkong group a day before which angered the Chinese officials and resulted in a rare retort in the official news agency report.

Even since their arrival in the Chinese capital on Monday, the 12-member Hongkong delegation has persistently demanded that they hand in petition letters and eight boxes of signatures – to none other than Premier Mr Zhao Ziyang and Mr Ji Pengfei, head of the Hongkong and Macau Affairs Office, a top policy branch within the State Council.

They had threatened to boycott visits to nuclear installations arranged by their Chinese hosts and bring the signatures and petition back to Hongkong if their demand was not met.

But Chinese officials, who formed a reception committee to look after arrangements of the Hongkong group, said neither Mr Zhao nor Mr Ji were in Beijing and the Hongkong group may get a chance to meet their deputies.

The Hongkong group refused to accept any alternatives and was reportedly told by the Chinese that failure to deliver the petition to the reception committee yesterday afternoon, as requested, would result in cancellation of a planned farewell banquet.

The cancellation would have been a major breach of Chinese etiquette and would have indicated a near-final break between the petitioners and Chinese officials.

The one million signatures were collected in a recent campaign in Hongkong and the anti-nuclear lobby was set up to press Beijing to scrap the $27 billion Daya Bay nuclear plant that is to be built 50 km northeast of Hongkong.

'Irked'

Yesterday afternoon, in front of a barrage of photographers and reporters, Mr Li emerged to receive the two petition letters – one addressed to Mr Zhao and another to Mr Jiang Xinxiong, Minister of the Nuclear Industry.

He said he was assigned by the State Council to accept the petition and agreed to pass them to "leaders of the State Council."

Mr Li then left without speaking to the Hongkong protestors.

On Tuesday, blunders and offensive remarks made by the Hongkong delegates had angered the Chinese authorities so much that its official newspaper and news agency sent dispatches saying that the Chinese were "irked" by "inappropriate views" expressed by the group.

The news dispatch was considered unusual as the Chinese would rarely criticise their guests in such a direct and open means and the top leaders in Beijing appeared to be losing patience with the Hongkong group.

The incident occurred minutes after a guided tour of an experimental nuclear reactor on the outskirts of Beijing which the Chinese are proud of.

But the Hongkong delegates said the reactor could not be compared with the one to be built at Daya Bay which is for commercial use and has a much larger capacity.

They also declared their anti-nuclear position outside the prestigious China Atomic Science Research Institute where the reactor is located.

The same evening, the semi-official China News Service sent out a dispatch which said the Hongkong group were 30 minutes late for a meeting and some members "became impatient" during the meetings with nuclear experts.

As for the visit to the research institute, the dispatch said Mr Zhang Zhenghua "gave the Hongkong visitors a warm welcome but the representatives of the group delivered some inappropriate opinions which angered the hosts."

"Mr Zhang said he felt sorry about the incident," the dispatch added.

Mr Zhang then criticised the Hongkong group for "a lack of knowledge" in their comments.

Meanwhile, yesterday's *People's Daily* confirmed an earlier report by the *South China Morning Post* that China is willing to allow experts from the International Atomic Energy Agency to inspect the Daya Bay nuclear plant.

Tear Returns to Hong Kong

Hong Kong HONGKONG STANDARD in English 22 Aug 86 pp 1, 22

[Article by Andy Ho]

[Text]

A FURIOUS anti-nuclear delegation returned from Beijing late last night and pledged to "fight on" for the shelving of the Daya Bay nuclear project.

The head of the 12-man team, the Rev Fung Chi-wood, said his group is not convinced by the Chinese experts and still have the same anxieties over the nuclear installation as before.

He told *The Standard* that their mission has been distorted by the mainland press, which has "tailored the groups' speeches to suit their own needs."

A *China News Service* report last Wednesday quoted the Rev Fung as saying that they were satified with the result of their mission.

He said he did not recall having made any remarks to that effect and had only described their trip as a "partial success."

Said the Rev Fung: "We are glad that we handed over the one-million signature petition to a State Council official, but we are very disappointed that the arrangement was made only after much bargaining."

The Chinese leaders conceded to have the vice-director of the Honkgong and Macao Affairs Office, Mr Li Hou, to receive the petition only after the group threatened to bring the signatures directly to the office of the State Council, he added.

The signatures were presented at the Beijing Science Hall.

Another member of the group, Mr Anthony Ha, said the officials advised them that a direct petition to the State Council would breach the "Beijing norms."

The group accepted the new arrangement because they thought that "dialogue is better than confrontation."

But it turned out that there were little chance for "genuine dialogues," said the Rev Fung.

He said most of their activities arranged by China were either guided tours or presentations of prepared speeches.

In the five-day stay, they were only allowed less than an hour to raise questions relating to Daya Bay, during which they managed to ask about eight questions.

The Anglican priest is also critical of another report *China News Service*, headlined "Hongkong Citizens' Nuclear Phobia is Fading" which quoted him as saying the trip was an "eye-opener" and that he "appreciated" China's achievements in nuclear technology.

He said he only told the host after the visit he "has a better understanding of the nuclear research in China."

The activists were given a warm welcome by leaders of the 115-group anti nuclear united front on their return.

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HONG KONG FACES DANGERS OF NUCLEAR CONTAMINATION

Hong Kong HONGKONG STANDARD in English 29 Aug 86 p 6

[Editorial: "Food, Water and Radiation Don't Mix"]

[Text]

THERE are some aspects of the Legislative Council fact-finding mission's report on nuclear plant safeguards that may leave a bitter taste in the mouths of all who read it.

This is more than just a figure of speech. We are talking about those passages in the report that refer to contingencies which could have a direct bearing on the food we eat and the water we drink.

One of these *observations* from the secret report printed in yesterday's *Hongkong Standard* stresses the importance of "studying the possibility of atmospheric dispersion of radioactive release affecting the reservoirs and sources of water supply in Hongkong."

This is, in fact, a very crucial point. Hongkong relies for its water needs basically on two sources — water from the sky and water from the East River.

Another of the report's *observations* has to do with "contingency actions on food and water to be taken within a radius of 50 kilometres (50 miles in the United States) from the nuclear plant."

Long before the planned Daya Bay nuclear plant loomed menacingly over our northern horizon, water was a bone of contention here.

And large open reservoirs, such as the one at High Island, have long played a vital role in supplying Hongkong's water needs.

A glance at the map reveals that some of these reservoirs lie well within the 50-mile radius mentioned in the report.

It would seem to the layman that water must be one of the most easily contaminated elements.

Contamination will adhere to some solid substances, such as glass, we are told, and may therefore be removed. Other solid elements, such as wood, will absorb radiation.

When it comes to water, however, the radioactive substance, if it is soluble, will be distributed evenly throughout the lake, reservoir or whatever.

There are, however, no internationally accepted standards which tell us how high the radiation level must be before a body of water is rendered useless for bathing and drinking.

Whatever happens, however, it would be impossible to block off the area for six million people. If the water is rendered useless, you can forget about Hongkong.

Another *observation* in the Legco mission's report stresses the importance of "taking actions to ensure that the food supply to Hongkong will not be contaminated and drawing up measures to be taken if contamination occurs."

This also is a vitally important point for Hongkong since we get so much of our food from China.

This food, including vegetables, poultry, fish and pork, basically originates in China's Guangdong Province — and much of it from areas well within the 50-mile limit.

The Legco mission's report also deals with the safety aspects of Pressurised Water Reactors (PWR).

It tells us that the PWR type of reactor, as is proposed for Daya Bay, "is designed and will be constructed in such a way that

even in the event of a worst accident resulting in a core meltdown the containment building will be able to contain most of the radioactive products."

Readers of the report would we are sure have been much more re-assured if a stronger guarantee had been offered than the somewhat less than definitive phrase "*most of* the radioactive products."

The report adds that it is "more than unlikely" that an accident like the one that took place at the Chernobyl plant earlier this year would happen to a PWR."

Here again, the average reader would probably have preferred a stronger guarantee than the rather wishy-washy phrase "more than unlikely."

For our part, we would be much happier to learn that it would be "totally impossible" for a Chernobyl-type disaster to happen here.

None of this means that we do not realise that China needs nuclear energy. It is, after all, one way of bringing that country up-to-date in terms of technology.

We have made it clear in the past that we are not against the idea of China going nuclear.

If Beijing needs a nuclear power station in Southern China this is no concern of ours. China is entitled to it.

We do not, however, want to see a nuclear power plant located too close to Hongkong. And Daya Bay is, in our view, much too close.

This is borne out by the references in the Legco mission's report to a 50-mile radius for contingency actions on food and water.

We believe that China should consider re-locating the Daya Bay plant.

We realise that this would be an expensive proposition. But if China does not want to lay out this extra money, Hongkong should consider paying the difference.

In the meantime, we still believe that the Daya Bay plant should be the subject of a public discussion here. And that discussion should be held as soon as possible.

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ANTINUCLEAR LOBBY TOLD NO STOPPING OF DAYA BAY

Hong Kong SUNDAY STANDARD in English 17 Aug 86 p 1

[Article by Andy Ho]

[Text]

TOP executives of the Hongkong Nuclear Investment Company (HKNIC) have told the anti-nuclear lobby in unequivocal terms that the company is determined to go ahead with the Daya Bay project and has no intention of backing out in the face of public pressure.

The company's chairman, William Stones, confirmed yesterday that major construction and equipment supply contracts for the $27.3 billion installation will be signed in mid-September.

The Chinese State Council is scheduled to ratify the Guangdong Nuclear Power Joint Venture Company's commercial agreements with foreign contractors on October 7.

HKNIC, a full subsidiary of China Light and Power Company (CLPC), is a 25 percent partner in the Joint Venture Company. A total of 70 percent of the power output of the future Daya Bay plant, which will have a capacity of 1,800 megawatts, will be sold to CLPC for local consumption.

Mr Stones met five leaders of the Joint Conference for the Shelving of the Daya Bay Nuclear Plant at the CLP headquarters yesterday morning — on the eve of the departure of the group's leaders for Beijing for face-to-face talks with the Chinese leadership.

He estimated that, compared to a coal-fired station to be built here, the Daya Bay nuclear option will result in savings up to $33 billion over the first 20 years of operation.

His company thus sees no point in turning the nuclear facilities into a conventional power station, added Mr Stones, who is also the CLP managing director.

The convenor of the 110 group united front, the Rev Fung Chi-wood, told reporters that the meeting with HKNIC officials was a "friendly" one.

But he said he was not convinced by the company's arguments as they were not substantiated with detailed figures, the Anglican priest said.

He urged HKNIC to explain to the public in layman's terms how it has come to the conclusion that nuclear power is more economical in the long term.

Their demand for an immediate release of all HKNIC reports on the financial aspects of the project was rejected at the meeting.

The company officials insisted that such data were not only commercially sensitive to CLPC and HKNIC but to its Chinese partners as well.

The group's call to terminate the power purchase contracts until the consumers are assured of a low-cost nuclear power supply was also rejected.

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WRITERS DESCRIBE START OF DAYA BAY PROJECT

Hong Kong SUNDAY STANDARD in English 17 Aug 86 p 7

[Article by Stephen Morgan and Sharmila Gopinath; first paragraph is SUNDAY STANDARD introduction]

[Text] In the second instalment of a three-part series on the energy economics and policy of the Daya Bay nuclear power plant, Stephen Morgan and Sharmila Gopinath look at the history of China Light and Power's affair with nuclear power. They also explain the methods used by the company for power forecasting.

HONGKONG'S involvement in a Guangdong nuclear power plant will go down in history as the ultimate dream of one man: the chairman of China Light and Power, Lord Kadoorie.

As much as reports point to the technical feasibility of the Daya Bay nuclear power plant, the original proposal had little to do with the economics of power or the need for electricity.

It was a wholly political ploy, the brainchild of Lord Kadoorie, who in 1979 successfully negotiated an agreement to sell electricity to China.

"It was always the wish of our chairman to trade with China," a company spokesman told the *Sunday Standard*.

That agreement was signed in March 1979 and the next month power began flowing to the system of Guangdong Power Company (GPC) in Shenzhen. During this deal the idea of a feasibility study was put forward.

An agreement was signed and CLP launched itself into the study which would comprise five volumes when completed in November 1981, concluding that a nuclear power station was technically feasible.

Copies of the report were delivered to Guangdong Power Company and to the governments of China, Britain and Hong Kong. The Chinese were enthusiastic, according to Lord Kadoorie in the company's history, *Power: The Story of China Light*.

"We gave 100 copies to the Chinese," he recalled. "They said they'd never seen a report like it before, and that it was of tremendous importance and interest since it set the way big projects should be investigated prior to embarking on them.

"As a result we gave them another 200 copies."

But the proposal was one Lord Kadoorie knew would be made or broken by governments, not power companies.

In a letter to the GPC accompanying these volumes, Lord Kadoorie wrote: "The proposal to build a nuclear power station in Guangdong Province to supply power both to Guangdong Province and Hongkong is a project of such importance and magnitude as to remove it from the level of ordinary commercial enterprise.

"No 1 act word has been written. The agreement between CLP and GPC was without the approval of the Chinese government, and Beijing had considerable

reservation about Guangdong as the site for a nuclear power plant.

Moreover, a major internal rift broke out between as many as 12 different ministries with an interest in the project, of which the prime conflict was between the Water Conservancy and Electrical Power Ministry and the Ministry of Nuclear Industry, both of which wanted the project to be their own.

CLP's 1982 annual report disclosed the draft agreement with GPC for the supply of power: Over 20 years CLP would take 60 percent of generated power (at first it was to be only 40 percent, and now 70 percent).

The foreign exchange earned from the sale of electricity would be used to repay the capital and interest charges on the international capital used for construction of the project.

Lord Kadoorie is quoted in the company history as saying that China Light's purchase of electricity would be sufficient to pay for the nuclear power station by 2009, at which time purchases of power could be reduced to 40 percent.

What this arrangement amounted to was a development fund to allow China to acquire foreign nuclear plant technology without having to spend any of its foreign exchange earned from conventional exports.

And what Hongkong got in exchange was security of its future.

Deputy chairman of CLP, Sir Sidney Gordon, is quoted in a report in the *Oriental Daily* of May 1982 saying political factors outweighed the interest of shareholders in assisting China to develop the Guangdong nuclear plant.

Joint Sino-Hongkong construction, he said, would strengthen relations and ensure the stability of Hongkong's future, and since CLP would buy the electricity which would pay for the plant, Beijing would not want to rock the boat of prosperity.

This thought is also attributed to Lord Kadoorie in the company history: "Obviously if the Chinese were to be paid in our dollars, they would want to be sure that this currency retained its value."

It is a reasoning that seems to have swept along all governments. During the August 1982 visit to Guangdong of Hongkong's governor Sir Edward Youde, the provincial governor told him that the State Council had approved the project and that it would be in Shenzhen at Daya Bay.

[illegible] Hongkong Government has agreed in principle to CLP buying electricity from the nuclear power plant.

But the smooth sailing bumped into some turbulence in the shape of terse remarks by Prime Minister Margaret Thatcher during her visit to Beijing in late 1982, which kicked off the Sino-British talks on the future of Hongkong.

In 1983 Sino-British relations hit a low.

Although the Hongkong Nuclear Investment Company, a wholly owned subsidiary of CLP, was formed during the year, the formation of the Guangdong Nuclear Power Joint Venture Company (GNPJVC) — the owner and operator of the nuclear power station — in which it would hold a 25 per cent interest was put on hold.

A perceptive article in the Chinese journal *The Nineties* argues that Daya Bay became a political chip in the talks on Hongkong's future. Even more so since all the big nuclear vendors were after a piece of the action and CLP was keen for the General Electric Company to supply the generating set.

It was only the successful resolution which flowed from Sir Geoffrey Howe's trip to Beijing in April 1984, at which he relinquished all British claims to Hongkong after 1997, that the obstacles to the joint venture were removed.

Lord Kadoorie in the annual report for 1984 disclosed that the joint venture contract was about ready. Upon Mrs Thatcher's signing of the Joint Declaration on the Future of Hongkong in Beijing on December 19, 1984, the nuclear show rolled again.

In January 1985 Lord Kadoorie signed the joint venture contract in Beijing and the next month the GNPJVC was established. The basic cradle for the dream was in place.

Over the next two months it will be given full legal form with the signing of the Bank of China loan, the electricity take-off agreements, and three key contracts with Framatome for the nuclear assembly, GEC for the generators, and Electricite de France for project services.

And the politics of the whole deal was eloquently expressed in a pamphlet reprinting a series of articles from the pro-Beijing *Da Kung Pao*. Far from threatening Hongkong's safety, the plant would bring benefits.

In fact, China's main reason for building a nuclear plant at Daya Bay is to ensure Hongkong's later stable prosperity, it stated.

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CSO: 5150/0004

DAYA BAY REPORTS DEMANDED BY LEGISLATORS LISTED

Hong Kong SOUTH CHINA MORNING POST in English 19 Aug 86 p 20

[Text]

LEGISLATORS and anti-nuclear groups are seeking to obtain copies of a long list of unreleased reports on the Daya Bay project.

Although the Government has released some information, the groups believe it holds a number of reports written some time ago on the nuclear power plant, and that it is awaiting new reports currently being compiled.

Both the legislators and the groups are particularly concerned that information on safety measures and economic aspects of the $27-billion project should be made public.

They named some of the reports which they are particularly anxious to see. These include:

● **Feasibility Study Report on Joint Development of A Nuclear Power Station in Guangdong Province**: Jointly compiled by the Guangdong Power Company and the China Light and Power Company in 1979 and 1980, the five-part study covers site selection, equipment, system design and financial and economic considerations.

Three volumes of the report were released to Legco – though not to the public – but the parts covering financial and economic aspects of the project were withheld. In addition, the volumes released had been cut and contained little on safety measures at the plant.

● **Lazard Brothers' report**: A merchant banking study commissioned by the Government several years ago to examine the economic justification for Daya Bay.

It was conducted to look into the financial implications of the scheme to ensure that it would benefit local consumers.

● **Report on Umelco's overseas nuclear fact-finding trip**: Currently being compiled by delegates who recently went to Europe, the US and Japan to gather information on overseas nuclear plants.

Leader of the fact-finding missions, Miss Maria Tam, said upon her return to the territory last week that the delegations would compile a report within six weeks.

Umelco has said it will submit the report – which will include a contingency plan – to the Government, but it is not yet clear whether it will be released to the public.

● **Reports by the Harwell Consultants**: Compiled by United Kingdom Atomic Energy Authority (UKAEA) consultants at Harwell as part of a $2.1-million consultancy package commissioned by the Hongkong Government.

Completed reports cover public education, equipment, radiation monitoring and accident assessment.

These have not been officially released to the public or to Legco, but the one on accident assessment was leaked to the *South China Morning Post* late last week.

● **Information collected by the Government**: A team of three Government officials left for Britain last Friday for further discussions with the UKAEA on aspects of the Harwell consultancy.

The team comprises Mr John Wilson, representing the Economic Services Branch, Dr M.C. Wong, for the Royal Observatory and Mr Graham Osborne from the Electrical and Mechanical Services Department.

Anti-nuclear activists demand that the results of such discussions, together with the information previously collected by the Secretary for Economic Services are released as soon as possible.

● **Contingency plan**: UKAEA experts are now studying what sort of emergency arrangements would be required in case of a nuclear accident at Daya Bay.

Their report, also commissioned by the Government, is scheduled to be completed next year but Miss Maria Tam has urged that it should be produced as quickly as possible.

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DISCUSSION OF, FEARS ABOUT DAYA BAY SAFETY

Safety Analysis for 1988

Hong Kong HONGKONG STANDARD in English 25 Aug 86 pp 1, 12

[Article by Andy Ho]

[Text]

CHINA will not have a complete picture of the safety aspects of the Daya Bay nuclear plant until late 1988 — more than two years after the equipment supply contracts for the installation are signed.

Mr Shi Chanchang, vice-director of the Chinese Nuclear Safety Administration, said the mainland experts will finish their analysis of a French safety assessment on the project by November 1988.

He told a Hongkong anti-nuclear delegation in Beijing last week that a team of over 30 Chinese experts was formed early last year in preparation for analysing a "Prilimary Safety Assessment (PSA)" of the Daya Bay project to be completed by a French contractor.

Framatome, the manufacturer, will carry out the safety study only after the Guangdong Nuclear Power Joint Venture Co has signed to order two of its pressurised nuclear reactors.

But the anti-nuclear activists yesterday said the vice-director has failed to answer why the Chinese have to sign the buying contracts before they know the preliminary safety aspects of the project.

The Hongkong Nuclear Investment Co, a 25 per-cent partner in the $27-billion investment, said in an earlier statement that the major contracts for the Daya Bay project will be ratified by the Chinese State Council in early October.

Mr Shi said the PSA will cover studies on the "particularly fragile sections" of the nuclear installation so that appropriate safety measures can be incorporated into the system.

The International Atomic Energy Agency will assist the Chinese scientists in the analysis on the Framatome report. The evaluation will be completed in three phases by November 1988.

Mr Shi has assured the delegation that the analysis of the PAS will be conducted under 18 headings and in compliance with the guidelines set by the Nuclear Regulatory Commission of the United States.

Mr Anthony Ha, who returned from the anti-nuclear mission to Beijing last Thursday, said in a press conference yesterday it is unconvincing for China to commit itself to the project before questions on safety are cleared.

Mr Ha called it "worrying" that China has decided to turn to the nuclear option even before the safety regulations are ready.

Residents' Committee Likely

Hong Kong SOUTH CHINA MORNING POST in English 26 Aug 86 p 1

[Article by Stanley Leung]

[Text]

BEIJING has promised to consider setting up an advisory committee comprising Hongkong and Guangdong residents on the safety of Daya Bay nuclear project.

The message was delivered to a 30-member delegation of local politicians in an apparent move to allay local fear on the controversial project.

Speaking on their return to Hongkong last night after a five-day visit to the Chinese capital, representatives said they had been given the news by the deputy head of China's Atomic Energy Science Academy, Mr Zhang Zhenghua.

The delegation's leader, Mr Ng Shiu-pang, said Mr Zhang promised to consider their suggestion on the establishment of the advisory committee comprising residents in the affected areas such as Hongkong, Shenzhen, and other parts of Guangdong province.

He had also promised that Hongkong people would be given safety information on the plant and that the project would be subjected to international surveillance.

Mr Ng said they were satisfied with Mr Zhang's promise and believed the possibility of setting up the committee was quite high.

The delegation, which was made up mostly of district board members and two Legislative Councillors, Mrs Pauline Ng and Mr Jackie Chan, told the Chinese scientists the committee advising Beijing on safety aspects of the plant should be set up as soon as possible.

If such a committee is to be set up, Mr Ng said, it could be regarded as an official organ to channel Hongkong people's views.

Consequently, there would be no need to resort to signature campaigns.

Mr Zhang emphasised that there was no need to work out an evacuation plan for Hongkong, adding that some 300 Chinese scientists were working on a comprehensive contingency plan for likely accidents to the plant.

Demands for Postponement

Hong Kong SOUTH CHINA MORNING POST in English 3 Sep 86 p 19

[Excerpt]

ANTI-nuclear campaigners, led by radical Mr Fung Chi-wood, called for a six-month postponement of the Daya Bay project yesterday while members of the pro-nuclear faction under Urban Councillor Mr Kwan Lim-ho, declared their confidence in the safety monitoring work on the project.

The Joint Conference for the Shelving of the Daya Bay Nuclear Plant called a press conference yesterday afternoon to voice its demand for the postponement.

Mr Fung said the authorities should try to relieve public anxiety over nuclear energy during the six-month period.

Mr Kwan's group, calling itself Daya Bay - the Scientific Approach Group, reported the findings of a recent visit by members to Beijing with the help of video tapes.

"Members of the National Nuclear Safety Administration in China are well-experienced nuclear experts who have been trained overseas. We therefore have great confidence in their solemn attitude when they check and approve the Daya Bay project," said Mr Kwan.

Mr Fung, in his press meeting, said the call for a moratorium did not mean the group had relinquished its fight to stop the building of the plant.

"We hoped the authorities will do everything they can to relieve the public's anxiety over nuclear energy during the period," he said.

Whether the joint conference would carry on with its fight afterwards would depend on how the public felt about the issue at that time, he said.

"There is no point in us carrying on if we don't have the support of the public," said another leader of the joint conference, veteran unionist Mr Wong Wai-hung.

The joint conference supports the call for a special Legco session to discuss the issue and also wants the Executive Council to review again whether Hongkong should continue to take part in the nuclear project, he said.

In response to comments that the joint conference opposed the Daya Bay project because it had no faith in China, Mr Fung said: "It's not that we don't have faith in China. We fight because we don't have faith in nuclear energy."

Fears About Safety Chief

Hong Kong SOUTH CHINA MORNING POST in English 25 Aug 86 p 1

[Article by Albert Chan]

[Text]

MAJOR contracts for the supply of equipment to the Daya Bay nuclear power plant will be signed with French and British contractors in the middle of next month.

The Guangdong Nuclear Power Joint Venture Company's general manager, Mr Zan Yunlong, yesterday confirmed that although there was no fixed date for the signing, it was likely to be between September 11 and 20.

According to this schedule, the contracts will then be handed over to the State Council for final endorsement, expected to be complete by September 25. The joint venture company will then inform the French and British contractors about this endorsement and will work out various details about starting work.

These negotiations will take another 10 to 12 days leading to the October 7 deadline, which must be met because the joint venture company on April 17 signed letters of intent with the French and British suppliers.

The letters stipulate that if they do not take full effect within six months minus 10 days, that is October 7, fresh negotiations will be needed.

Mr Zan's disclosure of the timetable contradicted a statement by Miss Maria Tam on Saturday when she claimed that "to the best of her knowledge", the contracts would not be signed in the middle of next month.

THE top Chinese official in charge of nuclear safety may not be an impartial watchdog because of his other job as technical adviser to the ministry responsible for the Daya Bay plant.

Hongkong anti-nuclear lobbyist Mr Anthony Ha said yesterday that the official, Mr Jiang Shenjie, head of the recently formed National Nuclear Safety Administration, could have a conflict of interest because of his other role as adviser to the Nuclear Industry Ministry.

Mr Ha, who has just returned from Beijing with members of the local anti-nuclear lobby, said there was a similar concern about the possible involvement of Vice-Premier Mr Li Peng, who was responsible for energy policy and may be in charge of both the NNSA and the Nuclear Industry Ministry.

"We believe no one in the NNSA should hold any position in the Nuclear Industry Ministry. The NNSA must guarantee impartiality," said Mr Ha.

"The NNSA should be directly responsible to the Premier, Mr Zhao Ziyang. If both organisations fall under the control of the same vice-premier, there will be inevitable concern about the independence of safety monitoring."

Although the Guangdong Nuclear Power Joint Venture Company, a commercial enterprise involving Hongkong's China Light and Power Company, will build the Daya Bay plant, the project is under the direct control of the Chinese Nuclear Industry Minister, Mr Jiang Xinxiong, who answers to Mr Li.

NNSA's responsibility is to inspect and monitor the whole project – from design, construction and commission through to its operation.

The joint venture company, with the help of the French, must satisfy NNSA that the plant will be built on safe ground by qualified personnel before a licence to start work is issued.

After completion, the company again must satisfy the NNSA on safety aspects of the station before a licence to operate will be granted.

According to Mr Ha, when the Hongkong group raised the question of conflict of interest in Beijing, the Chinese officials were only able give bland assurances.

Procedure

"They told us the officials involved will strictly abide by the law and there will be no problem about impartiality," said Mr Ha.

Other members of the group expressed the same concern and pointed out that in the past China has been notorious for its rule by individual will instead of by law.

The anti-nuclear group was also unhappy with the procedure under which the plant is now being constructed.

Mr Ha said a preliminary safety assessment report on the Daya Bay project has not yet been completed and it is "unscientific" at the moment to claim that the plant will be safe.

According to the working schedule, the safety report will be compiled by the joint venture company building the plant and the French, but will not be completed before the signing of the equipment contracts.

But Chinese officials argued that the NNSA will have full discretion on licensing.

"We were told that if the Daya Bay is not up to the requirements of the NNSA, the NNSA will not give it a licence regardless of the ensuing financial loss that may be suffered by the joint venture company or the Nuclear Industry Ministry," said Mr Ha.

Finally, the group said NNSA is just beginning to draft a long list of safety requirements which is expected to take several years to complete.

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TEAM TOLD CONSTRUCTION OF DAYA BAY PLANT TO PROCEED

Hong Kong HONGKONG STANDARD in English 27 Aug 86 p 2

[Article by Albert Chan]

[Text]

CHINA'S Nuclear Industry Minister, Mr Jiang Xianxiong, yesterday stressed again his country's determination to go ahead with the Daya Bay nuclear project despite objections from the public.

Mr Jiang was apparently referring to a Hongkong anti-nuclear lobby group which had just returned from a fact-finding trip to Beijing and figured in a near confrontation with the Chinese authorities.

Activists

He repeated Beijing's position on the controversial project to a group of Urban Councillors and district board members who were in the Chinese capital on a nuclear fact-finding trip.

The 11 delegates, calling themselves "Daya Bay – the Scientific Approach Group," were led by Urban Councillor Mr Kwan Lim-ho.

They had been labelled in Hongkong as the "counter-force" to the high-profile anti-nuclear activists led by Mr Fung Chi-wood and other pressure groups.

When Mr Fung's group was in Beijing last week, Mr Jiang did not come out to meet them. Instead, they were briefed by several of his middle-ranking staff.

This was regarded by some observers as a slap in the face.

Mr Jiang's statement yesterday was another indication that objections from Hongkong and the one million signatures delivered by Mr Fung were not going to affect the project in any way.

Many consider the project already a fait accompli, although the final contracts have not yet been signed.

"The Chinese Government will treat the matter with a scientific and practical attitude. It will not halt the Daya Bay project because of objections from some people," Mr Jiang was quoted by the China News Service as saying.

Mr Jiang also revealed to the visiting Hongkong group that China's other nuclear plant, which is under construction in Qinshan, near Shanghai, will be expanded from the present plan of one 300 megawatt reactor to four more reactors.

"Work on the Qinshan plant started in 1983 and will be completed in 1989 while the Daya Bay plant will not be completed until 1992. The experience gained in Qinshan will therefore benefit the Daya Bay project," said Mr Jiang.

Risks

The Hongkong delegates also met Mr Shi Guangchang, a senior official of the National Nuclear Safety Administration, who commented on the controversial Harwell Report on accident assessment which was compiled by experts of the United Kingdom Atomic Energy Authority.

This report was commissioned by the Hongkong Government to determine the risks that the Daya Bay plant posed to Hongkong. Its findings had caused concern among top Government officials here.

Mr Shi yesterday said that while China may use such reports as the Harwell as reference, they had no legal status.

"The safety assessment report which is now being prepared is based on international safety regulations with the blessing of the International Atomic Energy Agency. It is therefore the most authoritative," said Mr Shi.

"Reports compiled by other countries do not constitute a legal document."

● The Hongkong Civic Association yesterday called for the joint venture company building the Daya Bay plant to shift the station further away from Hongkong to allay local people's fears.

At yesterday's meeting, association chairman Mr Hilton Cheong-Leen said the group had decided to send a letter to Chinese Prime Minister Mr Zhao Ziyang asking that the plant be relocated.

He added that although changing the location of the project from Da Keng to an area east of Hu Tou Jiao might not be ideal, it was a proposal worth considering.

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FURTHER REPORTAGE ON ASPECTS OF DAYA BAY SAFETY

Accident Survival Plan in 1991

Hong Kong SOUTH CHINA MORNING POST in English 30 Aug 86 p 1

[Article by Albert Chan]

[Text]

HONGKONG will have a nuclear accident survival plan in place by 1991 – about a year before Daya Bay nuclear plant is due to be commissioned.

The Government will then begin conducting regular exercises and drills to test the efficiency of the disaster plan and to ensure that Hongkong is ready to cope with any nuclear mishap by the time the power station opens.

The timetable for the introduction of emergency procedures was disclosed by the Principal Assistant Secretary of the Economic Services Branch, Mr John Wilson, who is the "Daya Bay man" within the Government.

His branch is the overall liaison and policy centre within the Government which is handling the controversial issue.

Mr Wilson was in the branch working closely with the former Economic Services Secretary, Mr Piers Jacobs, back in 1983 and 1984 when the Government and the Executive Council gave the go-ahead for the project.

He recently returned to the section as the nuclear safety issue intensified after the Chernobyl accident.

During a recent trip to Britain, Mr Wilson and two other Government officials met experts of the United Kingdom Atomic Nuclear Authority (UKAEA) to discuss the contingency planning report now being compiled by the authority.

The report, to be ready before the end of this year, will contain only proposals for emergency planning, Mr Wilson said.

Actual safety and emergency arrangements will be mapped out by the Government based on the report's recommendations.

One of these recommendations will be for the Hongkong Government to set up an emergency task force within the administration to cope with any mishap.

UKAEA experts also advised the Government to have regular drills for officials in this task force so that they could be activated immediately an accident occurred.

This suggestion was put to a Hongkong Government delegation during their recent visit to Britain to meet UKAEA experts based in Harwell.

The Hongkong delegation comprised Mr Wilson, Mr Graham Osborne, director of Electrical and Mechanical Services Department, and Dr M.C. Wong, who is in charge of radiation monitoring at the Royal Observatory.

UKAEA officials agreed to a request from delegates to write the report in layman's terms, so that the public could understand.

The Hongkong delegation also spoke to another group of UKAEA experts at Culcheth who are compiling the phase two report of accident assessment on the Daya Bay nuclear station.

The earlier phase one report, which was confidential but leaked to the media, caused considerable controversy, especially the part dealing with the probability of a serious accident.

It highlighted the unlikelihood of an accident – and was released before the Chernobyl disaster.

Mr Wilson said yesterday the issue of accident probability was brought up in the discussion with the experts, who told the Hongkong officials they stood by their study.

But the second phase report, at the request of the Hongkong Government, will include consideration of Chernobyl.

These British experts attended this week's International Atomic Energy Agency meeting in Vienna which diagnosed the Chernobyl case. They will report to the Hongkong Government on the Vienna discussions.

However, due to the expanded scope the British experts have been asked to cover in this assessment report, it may not be completed until two years from now. It was originally expected to be ready next year.

Radiation Warning System

Hong Kong SOUTH CHINA MORNING POST in English 5 Sep 86 p 1

[Article by Sa Ni Harte]

[Text]

RADIATION monitoring equipment, which will give Hongkong warnings of any untoward events at Daya Bay when it starts operation in late 1992, is being tested by the Royal Observatory.

The observatory's $2 million of equipment should be able to take actual measurements before the end of the year and will be used in the Background Radiation Monitoring Program (BRMP).

Senior Scientific Officer of the Royal Observatory's radiation monitoring division, Dr M.C. Wong told the *South China Morning Post* yesterday his department had carried out tests with some of the newly-installed equipment.

He said his department – the co-ordinator of BRMP – started collecting water samples and had asked the Municipal Services Branch to collect food samples such as meat, poultry, milk and rice this month.

Other Government departments will help to collect samples such as soil, ground water, seawater, seabed sediment, and seaweed.

The program will establish a baseline to measure any increase in radiation levels in the environment, Dr Wong said.

This will help to detect any increase in radioactivity from Daya Bay plant when it is ready in late 1992.

He said the first step in monitoring the plant would be to see whether there was any increase in radioactivity in the atmosphere before and after its operation.

The observatory will be working with the Government Laboratory in analysing samples.

The laboratory has set up a radio-chemistry laboratory next to the Royal Observatory's measurement laboratory in King's Park, Kowloon, to support its work.

Dr Wong said: "When we have the instrument installed and tested, we will start doing some sample testing depending on which system we have installed.

"Once we have one system operating, we will start doing the measurement of samples with that system.

"We haven't started measurement yet but we have begun testing methods and procedures in operating the equipment already installed.

"We are aiming at a full implementation of the program by 1989. If the commissioning of the Daya Bay plant is in 1992, it will give us at least two years of complete data."

Recommendations From Harwell

Hong Kong HONGKONG STANDARD in English 30 Aug 86 p 3

[Article by Andy Ho]

[Text]

THE UNITED Kingdom Atomic Energy Authority at Harwell has proposed to the Hongkong Government to set up a body to assess the potential hazards of the Daya Bay nuclear power plant and to map out corresponding emergency measures.

A three-man team, headed by the Director of Electrical and Mechanical Services, Graham Osborne, had detailed talks with Harwell officials in Britain last week.

They also discussed with consultants the necessary contingency plans in case of a nuclear fallout.

Details including manpower requirements for such a set-up, staff training and facilities, and the need for regular exercises were also discussed.

Harwell experts will complete their remaining two studies on the Daya Bay project within two years. They have already finished reports on "Appraisal of Background Radiation Monitoring Programme," "A Public Education Strategy," an "Evaluation of Equipment Specifications" and the controversial "Accident Assessment Phase I."

The consultants report on contingency planning is expected to be ready before the end of the year. Hong Kong officials have provided the consultants additional technical data that Harwell consultants had asked for.

Another report — "Accident Assessment Phase II" — will be completed in 18 to 24 months. An account on possible water and food chain pathways of exposure to radioactive materials will be included in the study.

Mr Osborne has reportedly criticised the Phase I assessment as too generalised and not site specific as well as failing to take account of the Chernobyl disaster.

A Government spokesman said the consultants have confirmed that the Phase I assessment was intended as an initial study on the likelihood of various accidents at the Daya Bay station and their possible radiological consequences for Hongkong.

The Phase I report says "the probability of a severe accident is assessed at one chance in 20,000 reactor year of operation."

This estimation was based on studies related to typical existing European installations similar to the Daya Bay plant. These findings will be refined in the second report, which is expected to be plant and site specific.

During the course of the Phase II assignment, the consultants will visit the territory from time to time to discuss with officials their progress.

In view of the Chernobyl developments, the two parties have also agreed to extend the original scope of the studies.

The consultants are now attending the International Atomic Energy Agency meeting at Vienna on the Chernobyl accident and will report to the Hongkong Government on it.

Any lessons that may be learnt from Chernobyl will be taken into account in the Phase II report on accident assessment.

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ATOMIC ENERGY COMMISSION INSPECTOR VIEWS CHERNOBYL LESSON

Safety Measures, Comparison to CS Reactors

Prague TRIBUNA in Czech No 30, 1986 p 17

[Text] "No human activity is without risk and that includes nuclear energy," chief inspector of the Czechoslovak Commission for Atomic Energy, Eng Jiri Beranek, began our discussion. But at the same time he did not forget to point out in his introducton that a nuclear reactor is roughly 10 times safer than all other sources of energy. This fact has not been altered by the accident at Chernobyl, which is constantly talked about by laymen and experts, with inevitable emotion, but also with a thoughtful approach. The results of the investigation into the causes of the accident were also discussed at a special session of the Politburo of the Central Committee of the USSR Communist Party.

[Question] Is it possible to say today what was the sequence of events in Chernobyl on April 26?

[Answer] A detailed analysis is not yet complete. It is still not known what was the initial cause, the first break-down which led to the chain of events of the accident. Nevertheless, we now have an overall picture of what happened at Chernobyl.

In the morning, the Number 4 unit of the power plant was in a planned shut-down. The output fluctuated between 6 and 7 percent, that is about 200 megawatts, apparently in order to prevent a so-called xennon poisoning, which would inevitably occur and would prevent quick reactivation of the reactor to full output. That happened at 1:23:40. During a10-second period the output of the reactor suddenly rose to half of its nominal value. Cooling water began to evaporate quickly and steam was produced. When it reacted with zirconium, one of the main construction materials of this reactor type, a considerable amount of hydrogen was produced. Hydrogen, as is well known, combines with air to make an explosive mixture. That is what caused the explosion or, more likely, several explosions which did considerable damage to the reactor and its core, the building and its equipment. Practically all the technical safety and localizing systems were immobilized, and as a consequence radioactive particles escaped from the power plant. At the moment of the accident the chain reaction was automatically interrupted.

As a consequence of the explosion a fire occurred in the engine room, which is located in this type above the reactor and contains the charging engine and part of the primary circuit. The intense fire--according to some reports flames shot up to 30 meters into the air--completed the process of destruction and put out of action part of the equipment which was not immediately affected by the explosion. Thanks to the great heroism of the firemen, the fire, which could have spread also to the adjacent Number 3 unit, was put out in 90 minutes. That is why most victims of the accident are self-sacrificing firemen. Once the fire was put out, the first, shorter stage of the Chernobyl disaster ended. Essentially all the important systems were destroyed, and radioactive material escaped, attaining a height of approximately one kilometer.

[Question] What happened next?

[Answer] In the meantime, the next phase of the accident occurred in the heavily damaged core. The shutdown of both the regular and emergency cooling circuits had the most serious consequences. Fuel rods in the exposed core gradually overheated and melted. This process was greatly exacerbated by the presence of 1700 tons of graphite in the reactor. At the operational stage the graphite reaches a temperature of 700 degrees and prevents quick cooling of the total system. It is actually immaterial whether it catches fire or not.

During those moments the most imperative task was to reduce the escape of radioactive material to a minimum and ensure the cooling of the reactor core, which was still releasing heat due to radioactive decay. Therefore, helicopters dumped more than 4,000 tons of sand, soil, boron, dolomite, limestone and lead to make a protective cover. In that way the release of radioactive material was quickly reduced and practically ended by May 13. At the same time, emergency procedures were introduced for intense cooling of the reactor floor with liquid nitrogen. A meltdown of the core by residual heat was prevented. At the same time the nitrogen created an inert atmosphere which prevents other chemical reactions from occurring.

[Question] What is being done in the power plant now?

[Answer] When the main tasks of this phase were taken care of--preventing the release of radioactive material and reducing the temperature--attention was focused on deactivating the nuclear power plant equipment and constructing a concrete containment structure for sealing the reactor. That work is still in progress.

[Question] Can you describe the type of reactor which is in use at Chernobyl?

[Answer] It is a boiling reactor of high capacity with uranium-graphite cooling by standard water. It has a long tradition in the Soviet Union. This type (RBMK) was used in the first Soviet nuclear power plant, which was also the first one in the world, in Obninsko as early as 1954. The same construction principles were retained for the experimental industrial units of the Belorajska nuclear power plant. Its long-term successful operation

made it possible to construct reactors of great capacity serially. Prior to the Chernobyl accident 16 of the standard type were in operation--both the 1,000 and the 1,500 megawatt units. The plans for a new generation--with an output of 2,400 megawatts--are being completed.

[Question] What are the systems of operation and safety in this type of reactor?

[Answer] First of all, it is necessary to know that it is made up of 180 independent circuits. Its special feature is that the reactor does not have a pressure vessel. The graphite gridwork is enclosed in a thin-walled hermetic container and fuel rods are placed in ducts made of zirconium alloy.

In principle this concept is highly reliable. Disturbing the integrity of the individual control ducts does not essentially pose any great danger. Changing them is a normal operational procedure. The equipment is provided with an emergency cooling system for the core, which is reliable even in the event of the maximum projected accident, an instantaneous transverse rupture of the delivery collector of the main circulating pump. The release of steam and radioactive particles if conduits and active ducts are damaged is prevented by boxes that are resistant to excess pressure of 4.5 kg per square centimeter. These function as safety covers (containment structures) in water pressure reactors. Any release during a projected accident is localized in these boxes and the steam condenses in a special basin barboter (as published) which is connected to the above-mentioned system. Safe operation is guaranteed by other measures as well. That is why similar types of reactors are used in other countries, including the USA.

[Question] Is the RBMK 1000 reactor different from other types that are in use? Can they have a similar accident?

[Answer] Compared with the most widely used water pressure reactor moderated and cooled by standard water (TYPE VVER), which is the foundation of our nuclear energy, the main difference is the physical characteristics. As a result, there is a fundamentally different layout of the core and primary circuit. The VVER type, moderated by standard water, is enclosed in a compact pressure chamber with a unified concept of central control and regulation. The RBMK type, which is moderated by graphite, is much larger in area and has pressure channels instead of a pressure chamber. The fundamental differences are the presence of flammable graphite, complicated construction and a complicated system of controls and regulations.

[Question] What are the implications of this?

[Answer] The differences are so significant that the same or a similar accident in a water pressure reactor is impossible!

This fact was confirmed by one of the groups of experts of the International Commission for Atomic Energy. They stated that it does not appear that a new physical phenomenon has been identified which would require an immediate modification of other types of nuclear power plants. Factors which determined

the causes and progress of the accident are typical for the RBMK type reactor.

[Question] Is it possible to compare the Soviet and Western concepts of nuclear safety of this type of reactor?

[Answer] Your best answer is the articles in the more serious segment of the Western press. For example, one of the largest US newspapers, the INTERNATIONAL HERALD TRIBUNE, wrote on May 20 among other things: "The Number 4 unit at Chernobyl was enclosed by a large containment structure made of heavy steel and concrete. To supplement it there was a water vessel under the reactor designed to suppress pressure by condensation of the steam, the area around the core was filled with nitrogen, which in contrast to oxygen does not promote fire, there were doubled and well-protected cables, modern control equipment of the same type as in Western countries, and a system of armatures and passages for closing off individual areas. All that is similar to safety equipment used in the USA and anywhere in the West."

The British GUARDIAN of the same date states that the safety system of the Number 4 unit at Chernobyl was designed for greater over-pressure than containment structures of many nuclear power plants in the USA and elsewhere.

[Question] The technical standards of the safety measures at the Chernobyl nuclear power plant were on a world level. How was it possible that an accident occurred?

[Answer] What determined the course and extent of the accident was the fact that the main safety systems--emergency cooling and a localizing barrier--were destroyed before they could be deployed. Had there been no chemical explosion and fire, it would have been obviously possible to stop the initial malfunction without consequences for the service personnel. The main contributing factor to the accident was, as has always been the case up till now, the human factor. Man failed first of all. It was determined that the accident happened because in a number of instances workers at the power plant grossly violated regulations governing the operation of the reactors, as was stated at the special session of the politburo of the Central Committee of the USSR Communist Party.

This case, however, suggests a comparison with the classic source of explosions and fires--a military conflict in which conventional weapons are used. A single rocket could cause a similar accident at any nuclear installation anywhere in the world. It is essential, therefore, to resolve in the forum of the United Nations and at the Geneva Disarmament Committee the question of prohibiting military attacks on nuclear installations, something the socialist countries have urged for a long time.

[Question] So far, we have discussed the technical aspects of the accident. Can you describe the situation regarding radiation?

[Answer] During the release of radioactive matter from the reactor an unforeseen event occurred on which the standard computers for calculating the spread

of radioactivity did not count. As a result of the flow of heat, one released radioactive particles immediately rose to a height of 1 to 2 kilometers. The continental flow of atmospheric strata dispersed them equally over the European continent so that nowhere--with the exception of the immediate area around the reactor--did radiation exceed the level of doses considered safe for the public.

[Question] What level are we talking about?

[Answer] Assuming that 1 to 3 percent of the fuel rods melted down, the fission material produced, for example, only about 7-21 grams of radioactive iodine 131. After it was dispersed over the European continent, the total fall-out of iodine 131 in individual countries was measurable in milligrams.

[Question] The monitors, however, did not become quiet....

[Answer] You are right. It points out their extreme sensitivity. They record practically every single breaking atom!

Thank you for the discussion.

Accident Causes and Consequences Assessed

Prague TRIBUNA in Czech No 31, 1986 pp 1, 17

[Text] After the Chernobyl accident we wrote about the problem of nuclear safety in TRIBUNA on several occasions. Today the purpose of our discussion with the chief inspector of the Czechoslovak Commission for Atomic Energy, Eng Jiri Bernanek, is to draw a lesson from the information we have so far. At the same time we want to show what direction the work of scientists, design engineers, planners, builders and operators, and the state supervisory personnel will take to improve the nuclear safety and operational reliability of nuclear power plants. We have to touch inevitably also upon some international aspects of nuclear safety.

It is necessary to focus on this because last year almost 400 reactors in 26 countries produced 15 percent of all electric power. Nuclear energy literally has an impact on the entire world. That, of course, is what makes it essential to reduce the possibility of risking a repetition of a similar unfortunate occurrence.

[Question] The causes of the Chernobyl disaster were discussed recently at a special session of the Politburo of the Central Committee of the CPSU. What are the lessons to be drawn from it?

[Answer] It is evident from the state commission's report on the results of the investigation into the causes of the accident at the Chernobyl nuclear power plant that no new physical phenomenon was detected which would have influenced the course of the fission chain reaction in the reactors or the operation of the nuclear power plant. The investigation found the cause to have been primarily inadequate implementation of operational procedures.

Violations of operational regulations and neglect of shortcomings culminated in human failure which was not confined to the power plant itself. It is a precondition for safe operation; to create an atmosphere conducive to compliance to regulations; it is the responsibility of a number of workers, many of whom were at central agencies far from Chernobyl.

The lessons are therefore explicit. The main points were summed up by comrade Michael Gorbachev already in mid-May of this year in his televised address, and the Politburo of the Central Committee addressed them during the discussions of the state commission's report. This concerns primarily the specific Soviet proposals to create an international system for developing nuclear power based on close cooperation among all countries. It is no exaggeration to say that this would be greeted by the entire world. Together we must not allow a similar disaster to happen again anywhere in the world.

[Question] What is the status of the Soviet proposals at this time?

[Answer] Groups of experts of the International Atomic Energy Agency (IAEA) in Vienna are now discussing the proposed agreements providing for timely information on nuclear accidents and mutual assistance in such cases. Both will be submitted for approval to the special session of the general conference of IAEA, which will meet in September.

[Question] What are the principles and the basis for the preparation of both these documents?

[Answer] The preliminary discussions make use, among other things, of our agreement with the Austrian republic concerning the disposition of questions of mutual interest related to building and operating nuclear power plants, which has been in force for over 2 years. It is, so far, the only example of a specific solution of a complicated problem between countries with differing political systems and attitudes toward nuclear energy.

[Question] What is the essence of this agreement?

[Answer] Once every 2 years we exchange our views on the development of nuclear programs in individual countries. The fact that nuclear energy is prohibited in Austria by law does not make any difference. Six months before putting on line any reactor located close to common borders, experts from both countries evaluate its readiness. For example, we held such consultations about all units in Dukovany. The agreement also contains a provision for establishing a special network of mutual understanding. In case of an unforeseen event, the other side will be given necessary information. That was why immediately after the Chernobyl disaster Austrian television, for example, broadcast a talk with one of the members of the joint group of experts, who explained in detail the safety features of our reactors.

The experience we have had in applying this agreement confirm that it is increasingly important to take similar steps in the international level. They are just as important as the necessary modifications or modernization and improvements of the monitoring system of radiation levels. But the main

attention has to be focused--and comrade Gorbachev emphasized this in his letter to the director general of IAEA--on measures which will remove any possibility of other nuclear accidents.

[Question] What measures are we talking about? What will be their thrust?

[Answer] The revolutionary idea is that scientists of various countries should cooperate in developing a new generation of reactors, as was stated in the resolution of the Politburo adopted during discussions of the state commission's report. The long-range goal is to construct a reactor in which a meltdown of fuel rods would be absolutely impossible. Basically, it is essential to prevent any situation arising in a nuclear power plant which would cause fuel rods to melt down and release large amounts of radioactive material. We also think it is very important to increase the effectiveness of the technical systems designed to prevent their release in the event that a meltdown of fuel rods has already occurred.

[Question] What are the principles on which IAEA based these goals for safe nuclear power?

[Answer] They are derived from global statistics of nuclear accidents. They demonstrate that similar events when a meltdown of fuel rods occurs--although they seldom occur--are among the most serious.

For example, in the case of the largest accident at the nuclear reactor at Three Mile Island in the USA, 50-70 percent of the fuel rods were affected (in Chernobyl only 1-3 percent). The expenses for decontaminating the power plant and the immediate neighborhood alone came to 1 billion dollars. More often, however, malfunctions of safety (localizing) systems occur. In cases when both of these problems are present in the same accident, which is very unlikely although it did happen at Chernobyl, the area around the power plant can be seriously affected.

[Question] Was this not the result of the fire?

[Answer] The detrimental effect of a fire on reactor safety has been noted many times. A classic example occurred at the Browns Ferry power plant in the USA where a lit candle started a fire! As a result, the reactor was taken out of operation for a whole year and damage amounted to $10 million. Warnings about fires have obviously been greatly underestimated in the past, so that the Chernobyl experience teaches us a specific lesson: any likelihood of a fire in a nuclear power plant has to be removed at all costs! Even more pressing is the need to eliminate any condition which would lead to the creation of an explosive mixture that could cause an explosion.

[Question] Why did the output in the Chernobyl reactor increase in a mere 10 seconds to half of its maximum?

[Answer] That is not yet clear. But even in this respect such individual malfunctions, which do not develop into accidents are not isolated cases. For example, in the American reactor Salem the automatic shut-down relay did

not function although the operational procedure required it, and it showed up on the control panel as having shut down. In reality, however, the reactor was not shut down. The technician recognized the problem in time and compensated by manual operation.

A brief look at the world statistics of nuclear accidents shows the importance of detailed information about the smallest, seemingly inconsequential, problems. Discussing them in IAEA is useful for all operators of nuclear power plants. Only a collective effort can fundamentally contribute to accelerating and increasing further improvements of the nuclear safety level.

[Question] Let's take a look at our energy situation. How does the Czechoslovak Commission for Atomic Energy, as the governmental supervisory agency, rate the nuclear safety level in Czechoslovakia?

[Answer] Our results are commensurate with the worldwide experiences of the performance of almost 400 reactors with more than 4,000 operational years behind them. The operation of the 6 reactor units of the type VVER 440 in Jaslovske Bohunice and Dukovany can be characterized as stable, reliable and safe. During the 23 years they have been in operation a situation never occurred which would or could lead to a release of radioactive material and to endangering the workers at the power plant or the environment. This system also proved to be very stable, with a considerable reserve in the most important parameters--heat removal and fuel rods.

[Question] These good results notwithstanding, strict governmental supervision of nuclear safety is in place. What does it involve?

[Answer] Our commission maintains permanent inspectors in all our power plants. Each day they check that technical and organizational measures that ensure safe operation are being followed. Moreover, inspectors of state supervisory agency make unannounced inspections. Last year there were 60 inspections, this year 38 to date. Since the beginning of last year, the state supervisory agency issued almost 200 rulings, assigning tasks with binding deadlines for resolving problems that were observed. There is no appeal against this in the law related to state supervision of nuclear safety, even if the order is to reduce output or stop operation of nuclear equipment.

[Question] We can therefore state that nuclear safety of our installations is of a high order. Nevertheless, what determinations have been made following the Chernobyl disaster?

[Answer] They are divided into short-term and long-term. Their common feature is that the prerequisite of high nuclear safety is the prescribed quality of equipment and systems, the qualification of workers who service them, and the conduct of the operation itself. We had that in mind when we immediately intensified our inspections.

On the basis of what we have learned, certain measures have already been taken. This includes, for example, strict observance of a work period not to exceed

8 hours for selected categories of operational specialists, supplementary equipment, and standardized lay-out of certain auxiliary junctions. An overall evaluation again showed that our nuclear power plants function at a high level of safety.

[Question] And the long-term measures?

[Answer] Analysis of the causes and consequences of the Chernobyl accident continues. A set of long-term measures is really just being formulated. Apart from new technical solutions, the need for which we discussed, it is already apparent that it will be necessary to review the comprehensiveness and effectiveness of all safety measures, including plans for protecting the public at both the state and international level. The development of the radiation situation and how to control it will also be the subject of long-term studies and deliberations.

[Question] The report of the Soviet state commission on the results of the investigation into the causes of the Chernobyl accident emphasized the importance of the human factor for nuclear safety. Is this fact also taken into consideration in our nuclear power plants?

[Answer] Man and his actions, behavior and decisions play an indispensable role even in a highly automated nuclear energy industry. The entire system of training selected operators of nuclear equipment and the demand for considerable expertise and comprehensiveness are based on this fact. Training takes place at the Trnava Branch Training and Educational Center of the Research Institute of Nuclear Power Plants Jaslovske Bohunice. Its equipment meets all the needs and requirements for specific expert competency expected of operational specialists. Their practical training is based on training simulator which can duplicate normal operations and a large spectrum of transient situations in the VVER 440 unit. The high requirements of the training, preparation at an institution of higher education, include the length of the course--it takes 2 years on average.

[Question] For how long is it valid?

[Answer] It is valid for only 2 years, and it is lost even in a case when a technician is, for example, transferred to another place of work for more than 6 months. Due to systematic training, which the state examination commission supervises, we now have more than 250 well-prepared, experienced technicians for nuclear equipment. It is also evident that they are well qualified from the relatively low number of problems due to human failure.

[Question] Would you like to say something in conclusion?

[Answer] In the concept of ensuring nuclear safety there are no differences among individual countries. All systems rely on preventing problems by constantly improving the reliability and quality of equipment and the operation itself and in measures ensuring the least possible consequences. That is the basis of the necessary safety level of nuclear energy. Basically, it is superior to that in other branches of industry. At the same time, however,

it is necessary to emphasize that nuclear safety in the world is unthinkable without stopping material preparations for nuclear war. Logically, it presupposes total liquidation of the means of waging war.

Thank you for the discussion.

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GROUP OF SIX MONITORING U.S. NUCLEAR ARMS TESTS, SAYS YRIART

Buenos Aires AMBITO FINANCIERO in Spanish 21 Aug 86 pp 36, 24

[Article by Martin F. Yriart: "Argentina Monitoring U.S. Nuclear Weapons Tests"]

[Text] In order to help end the nuclear arms race, Argentina and four other members of the so-called "Group of Six" have begun to monitor American nuclear tests with their seismographic network. Although no official announcement has been forthcoming so far, the program is already at an advanced stage. Now that the initial steps have been taken, that is to say, the recording of important seismographic data relative to nuclear explosions, study has begun on ways of integrating the national networks of the countries involved through a communications satellite and of expanding the number of participants. In addition to Argentina, Greece, Sweden, Mexico and India are currently involved in the effort. Tanzania, the sixth member of the group, does not for the time being have suitable facilities for this purpose. "The Six" have already communicated their decision to the nuclear powers and have extended an invitation to hold a meeting of experts from both sides to discuss the initiative and other proposals by the group to further disarmament.

Exhortations

Although the unarmed nations (and the "Group of Six" itself) have in the past urged the nuclear powers to dismantle their nuclear arsenals and have offered to mediate in securing reciprocal superpower assurances, this is the first time that a group of nations without nuclear weapons is taking specific steps that materially alter the strategic world balance by introducing a new factor.

Until now, nuclear tests were monitored only by the superpowers. Henceforth, however, there will be reliable information on their tests whose disclosure to the rest of the world will not depend on their good will. When the major powers tested their weapons in the atmosphere, the results could be determined directly by measuring the increase in radioactive fallout. This possibility vanished, however, when they decided to conduct nuclear tests underground.

Explosions

Nevertheless, the earth's seismic properties enable underground explosions to be detected at huge distances. Tests greater than a kiloton (one-twentieth as large as the Hiroshima bomb) in the Nevada desert can be detected from the observatory at San Juan University's National Institute for Earthquake Preparedness. Smaller tests could go unnoticed amid the seismic "background noise" that constantly bombards the earth. And other geological phenomena could make detection difficult from a remote spot. But a coordinated, satellite-linked network could obtain much more reliable results.

"The Six" decided in Mexico to build such a network, drafting a document dated 7 August 1986.

In addition to the decision that the group made independently, the document contains a series of proposals for on-site monitoring that will require the participation of the United States and the USSR. They call for the installation of measuring equipment at test sites (Nevada in the United States; Semipalatinsk and Nova Zemlya in the USSR) and elsewhere in the two countries, as well as the "internationalization" of 40 to 60 seismological stations already in place there. After a provisional stage that would test the system's effectiveness, definitive accords could be hammered out.

Such a system would resolve the United States' longstanding objection that an agreement to suspend nuclear testing as a preliminary step towards disarmament would be "unverifiable" by the parties. If a group of independent nations guaranteed compliance with the pact through its monitoring, the problem of "verifiability" would be eliminated.

When this solution began to take shape, however, the United States raised another argument against an end to nuclear testing: the tests are now necessary to develop the technology required for the Reagan administration's Strategic Defense Initiative (SDI), which according to its proponents would by itself do away with the threat of nuclear war.

The developing countries and the nonaligned nations have pointed out the preposterous cost of "arming oneself not to fight" and the benefits that would accrue to the world's economy if the huge amount of money currently earmarked for nuclear weaponry were used for peaceful purposes.

Although official discussions are still not under way, "the Six" are actively making contact with other nations that are interested in spurring this initiative to expand the seismological monitoring network and further this alternative to world disarmament. Experts from "the Six" are working hard to perfect the technical and informational mechanisms that are needed for the system to yield the desired results.

8743
CSO: 5100/2128

BRIEFS

CNEA MOVES TOWARD PRIVATIZATION--By virtue of Decree No 1008 the Executive Branch has authorized the establishment of a corporation in which private capital has a majority interest, to run the Special Alloys Factory of the Ezeiza Atomic Center. The purpose of the corporation, which represents the first step towards privatization within the National Commission for Atomic Energy, will be to produce and market zirconium-alloy casings and semifinished items for the manufacture of nuclear-fuel elements and related activities at any stage of their processing, as well as to produce and market ferrous and nonferrous metals. The decree, which has already appeared in the Official Gazette, states that the corporation "will consist of a majority of domestic private capital" and that "the capital, the management capabilities and the industrial operating experience that the private sector will supply will seek to give the Special Alloys Factory a level of productivity and efficiency that meets the requirements of the program to furnish piping and semifinished items for the manufacture of nuclear fuel." [Text] [Buenos Aires TIEMPO ARGENTINO in Spanish 16 Aug 86 p 11] 8743

CSO: 5100/2128

FOREIGN EXPERTS VOUCH FOR SAFETY OF ANGRA I

Sao Paulo ISTOE in Portuguese 20 Aug 86 pp 65-66

[Text] Some ten distinguished national and foreign experts and scientists achieved the feat of restoring a little of the prestige lost by the Brazilian nuclear program. A conference on reactor safety sponsored by the Brazilian Academy of Sciences held in Rio de Janeiro last week gave a practically unanimous endorsement to the operation of the Angra I plant and an incentive to the construction of Angra II and III. "Angra I is in very good operational condition," declared the most illustrious visitor, the Italian Enzo Iansiti, secretary for nuclear safety affairs of the International Atomic Energy Agency, whose experts visited and approved the plant's facilities last September.

It was a relief for industrialist Licinio Marcelo Seabra, 46 years old, president of NUCLEBRAS--the controversial state enterprise charged with managing the Brazilian nuclear program--irked in recent weeks by a succession of protests and political faux pas. Ten days earlier, the judge of the Angra dos Reis judicial district had issued an injunction holding up operation of the Angra I reactor because of a lack of safety measures in case of an accident. At that time, NUCLEBRAS was already at odds with the scientific community because it had ordered the publication of an announcement indicating that that community unreservedly defended the nuclear program. The broth thickened on the 6th when, over and above the whole controversy, President Jose Sarney decided to build Angra II and III, the partial cost of which as envisaged in the Goals Plan is $1.4 billion by 1989. Another $1 billion will be necessary if Brazil confirms its intention to build a uranium enrichment plant to supply fuel to the reactors. Those figures will obviously double considering the interest on the loans assumed to implement the projects. For example, Angra I cost $.24 billion and consumed more than $3 billion in interest and charges.

Little safety and much money ended up stigmatizing the nuclear program, which did not at all worry the specialists gathered by the academy. "It is only a matter of time before the Brazilians learn to like the atom," said the Frenchman Pierre Tanguy, inspector general for safety affairs of the Electricity Company of France. It cannot be said that such an optimistic conference was set up as one more lobby of the government-connected nuclear sector. Nevertheless, that did not keep it from being used. "It is with pleasure that I see the participation of eminent researchers at this meeting," said nuclear

physicist and engineer Rex Nazare Alves, chairman of the National Nuclear Energy Commission, representative of Brazil in the IAEA board, and the official in charge of safety in Angra dos Reis. "It came at a good time, when we are still experiencing the impact of the Chernobyl accident in the Soviet Union, and it is imperative that our safety actions enjoy the trust of the Brazilian nation," remarked Alves.

It is quite true that the Italian Enzo Iansiti advised Brazil to refine its safety requirements--without specifying them because the recommendations of the international agency are generally confidential. But this lack of refinement would not prevent the immediate start-up of operations by Angra I because the safety of nuclear reactors is an extremely complex exercise. In addition to the strict quality control of thousands of components to avoid accidents, it is necessary to have a rapid emergency system that, in the case of a failure, will interrupt the atomic reaction and prevent the escape of radioactive material into the environment. Also crucial is the plan for evacuation of the inhabitants in the neighborhood of the plant in the event that all other procedures fail. Brazilian experts guarantee that the Angra plants project admits of a minimum possibility of error--something like one accident in 2,500 years, with all three plants in operation.

"It is useless to try to prove that nuclear energy is not dangerous when we all know that it is," spoke up one of the few dissenting voices at the conference, that of Professor Jose Goldemberg, rector of the University of Sao Paulo, a moderate critic of the Brazilian nuclear program. "What remains to be seen is if it is necessary to live with those risks," he said, explaining that the Brazilian energy situation may be serious but it is not desperate, as the supporters of expansion of the nculear program allege. According to goldemberg, the prevailing idea of spending $4 billion in the energy sector, with emphasis on atomic energy, "was a victory for the nuclear lobby inconsistent with the real situation." In his opinion, it would be sufficient to apply conservation in the sector and operate only with the Angra I and II plants. Former Minister of Industry and Commerce Joao Camilo Penna, the current president of the Furnas Electric Power Stations, the operator of Angra, did not agree that the forecast of an 8.5 percent increase in energy consumption was excessive. "The estimate was made by conscientious people," he pointed out. "Historically, the evolution of energy consumption is calculated at 1.5 percent above the growth of the Gross National Product, and the current forecast for the growth of the GNP is 7 percent."

As for the victory mentioned by Goldemberg, that was Sarney's decision to order the construction of Angra III. But it was a limited victory. The nuclear program in fact has undergone a reduction, starting with the halting of the original plans for the uranium enrichment process. The fate of NUCLEBRAS itself, thus, remains open. Established to build and operate eight plants, according to the agreement signed with Germany in 1975, the state enterprise will have much more modest functions. There will be only three plants, and the last two will not begin to operate until 1995, not 1989 as had been scheduled. It is also not clear what will be done with the five subsidiaries, the function of which was to take care of the infrastructural requirements essential to the original ambitious project: from civil

engineering works and heavy electrical material to the complete uranium enrichment cycle. A presidential committee created to study the program suggested various solutions, from privatization to pure and simple abolition. "Everything now will depend on the financial equation for the energy sector," said Licinio Seabra, the president of the state enterprise. "The important thing is that the funds should guarantee continuity of the development of atomic energy." And he dreams on: "That is basic and it is not enough merely to engage in study. It is necessary to create a market for that merchandise in Brazil."

8711/12947
CSO: 5100/2120

NUCLEAR POWER ROLE IN FUTURE, VAALPUTS WASTE REPOSITORY

Johannesburg BUSINESS DAY in English 9 Sep 86 p 3

[Text]

NUCLEAR power will play a more significant role than coal in SA's longer-term electricity requirements, Mineral and Energy Affairs Minister Danie Steyn disclosed yesterday.

Steyn was addressing an international conference at a Cape Town hotel on treatment, packaging and dumping of radio-active waste in arid environments.

SA was currently largely committed to coal as the country's source of energy because of the large reserves and the Republic's reduced dependence on oil through the establishment of oil-from-coal technology.

However, the country's energy policy "recognises the fact that the future electricity requirements of the country will need to be met by a combination of coal-fired and nuclear power stations, with nuclear energy playing a more significant role in the longer term," he said.

Steyn also said the nuclear waste repository at Vaalputs, in the northern Cape, was scheduled to receive its first shipment of waste from the Koeberg nuclear power station near Cape Town in November.

"The quality and extent of research has led to its (Vaalputs') establishment being compared well with the best in the world.

"Indeed SA is one of the few countries, if not the only country, that identified a disposal site prior to the commissioning of its first nuclear power station," he said.

Steyn said attention was currently being paid to the question of storage of spent fuel at Vaalputs.

And an "expert group" had been established to study the question of the disposal of high level waste in SA.

"Although spent fuel from Koeberg may not be reprocessed in SA, we must face the possibility of waste arising from reprocessing fuel from Koeberg being returned to us from the overseas reprocessor for disposal," he said.

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CSO: 5100/1

ASCO REACTOR SHUTDOWNS PROMPT INVESTIGATION

Officials Concerned by Recent Shutdowns

Madrid DIARIO 16 in Spanish 25 Aug 86 p 12

[Article by Elias Pujol]

[Text] Tarragona. The continuing problems afflicting the Asco nuclear complex are of concern to both the towns near Asco and to the Nuclear Safety Council, which has begun an investigation to determine the causes of these repeated anomalies.

Last weekend within a period of less than 20 hours, the second unit of the Asco nuclear power plant suffered two breakdowns. In both incidents, rods were released, immediately shutting down the reactor.

The first of these incidents occurred shortly after 1100 on Friday [22 August]; by 2000 that evening the situation had still not returned to normal. Then at 0600 on Saturday morning, another technical problem caused the shutdown of unit number two; this was less than 20 hours after the first failure. In both cases the reactor was stopped immediately in order to avoid overheating.

These failures were triggered by problems with the valves of the steam generators which prevented proper cooling of the reactor.

According to sources from the plant, there were never any radioactive leaks causing any type of danger. The same sources reported that unit two of the plant will remain shut down until early this week. The anomaly was immediately reported to the Nuclear Safety Council, to the General Division of Energy, and to civil [illegible]nment officials in Tarragona.

Since July th[illegible] have been four emergency shutdowns at the Asco power plant, though at no time was there any danger of contamination caused by a radioactive leak. These failures took place on 1 and 23 July and 22 and 23 August.

Moreover, Asco I has been shut down since early in the summer for uranium refueling. This period has been used for an extremely careful checkout of all the circuits. Asco I is not scheduled to begin operating again until early September.

The repeated breakdowns and incidents which have been afflicting the Asco nuclear complex have been arousing anger in the towns located near the nuclear complex, and concern within the administration.

The Nuclear Safety Council, the organization which supervises the operation of all of Spain's nuclear power plants, has announced the start of an investigation to determine whether the failures are due to untimely failures in the components or, on the contrary, whether they may be caused by defects in the plant's organizational system.

The mayors of the towns of Flix and La Fatarella have expressed their concern about the repeated failures that have plagued the Asco complex since the plant first began operating.

Nuclear Safety Council Closes Reactor

Madrid DIARIO 16 in Spanish 26 Aug 86 p 15

[Text] Madrid. The Nuclear Safety Council yesterday ordered the shutdown of the Asco nuclear power plant until the causes of the failure of the safety valves and of the other anomalies which have led to repeated failures in unit two of the nuclear complex have been clarified.

To these technical failures a new anomaly must now be added; this was found yesterday in unit two during a routine review of its safety systems.

The new anomaly was a defect in the steam isolation valve in the reactor's secondary cooling system, according to sources from the plant's management.

Both Asco units are shut down now: unit one for fuel reloading, and unit two because of the two "emergency shutdowns" which took place last weekend.

The first incident happened on Friday, while the water isolation valve in one of the steam generators of the reactor's cooling system was being closed. The Saturday incident, according to the director of the Asco nuclear power plant, Ignacio Camps, was caused by the passage of air into the transformation gases, which led to the plant's shutdown. "When we tried to close the three steam isolation valves, one did not work."

Ignacio Camps added that liability compensation will be sought from the company which manufactured the valve, "whose technicians are now checking it."

The Nuclear Safety Council has also sent two inspectors who, accompanied by the Council's permanent representative at Asco, will investigate the causes of these anomalies.

Enrique Peira, deputy director of FECSA [Electric Power of Catalonia, Inc], the principal owner of the Asco power plant, stated that "the shutdowns at the plant were protective steps, not emergency situations."

The ministry of industry and energy, in a statement released yesterday, reported that the problems which occurred last weekend did not create any risk for the nearby population.

A History Replete with Accidents

Tarragona. So far in 1986, there have been 11 shutdowns of unit two (six of them in the summer). This unit began to operate on 23 October 1985.

The most recent were:

1 July 1986: Shutdown of the reactor as a result of the unscheduled closing of a water supply isolation valve.

Later, prior to the startup of the unit, while trying to close the three steam isolation valves of the principal circuit, two of them failed.

23 July 1986: Shutdown of the reactor as a result of the unscheduled closing of two water supply isolation valves.

22 August 1986: Shutdown of the reactor because of the unscheduled closing of a water supply isolation valve.

23 August 1986: Shutdown of the reactor because of the activation of the protective system of the main transformer. Later, before the startup, while trying to close the three main steam isolation valves, one of them failed while still open.

Investigation, Shutdown Concern Mayor

Madrid DIARIO 16 in Spanish 27 Aug 86 p 15

[Article by Elias Pujol]

[Text] Tarragona. The two technical experts sent by the Nuclear Safety Council to the Asco power plant yesterday began a careful investigation to determine the causes of the failures which have been occurring on a regular basis in Asco's unit two, and which have made this plant the most troublesome of all the nuclear plants operating in Spain.

In addition, yesterday a specialist from the U.S, firm, Monroe, came to Asco. This company takes care of operating mechanisms of the nuclear reactor's steam isolation valves.

The investigation of the causes which have led to repeated failures at Asco's unit two has been going on all week, reported the Nuclear Safety Council.

Urgent Meeting

The mayor of Flix, Pere Munoz, yesterday sent a telegram to the civil governor of Tarragona, Vicente Valero, urging him to call an urgent meeting of the district's civil protection council, which has not met for a year, in order to discuss everything that should be done after the failures which have been occurring in the Asco nuclear complex, and all the information and statements which have appeared in the media on Asco II, "and also to learn the contents of the telegram which the civil governor sent to the Nuclear Safety Council."

According to the mayor of Flix--who is a member of the Union for Municipal Progress--it is essential to discuss Asco's problems and to reach an agreement on revising the PENTA [Tarragona Nuclear Emergency Plan]. "After the Chernobyl accident, it became apparent that the PENTA provisions are inadequate," said the mayor of Flix.

He noted that, in the event of an accident, the PENTA only calls for evacuation of the population within a 3-kilometer radius around the nuclear complex, "while at Chernobyl the evacuation was within a 30-kilometer radius. The PENTA also recommends the evacuation of critical groups--children, the elderly and pregnant women--within a radius of 3 to 5 kilometers, and that is not enough."

The mayors in the Asco area are disturbed about the problems at Asco and about the heightened sensitivity among the region's population; these concerns have been increasing in recent days.

Neighbors Protest

This has become the hottest topic of news this summer in this area along the Ebro Riber.

Moreover, an antinuclear group of Asco's neighbors, headed by the former mayor of Asco, Joan Carranza, has announced that it will file suit in the courts if the Nuclear Safety Council does not immediately halt the operation of the Asco nuclear power plant.

This same group from Asco, with Joan Carranza in the lead, has also decided to undertake judicial actions against the civil governor of Tarragona for his approval of the PENTA, and against the town of Asco, for what they consider a lack of vigilance in watching out for the interests of the town's residents.

U.S, Technicians Consulted on Repairs

Madrid DIARIO 16 in Spanish 28 Aug 86 p 17

[Article by Elias Pujol]

[Text] Tarragona. Two U.S. technicians from the Paul Monroe company, which is responsible for maintenance of the safety valves in the Asco II power plant, have joined the group which has been working since last Monday on repairing the circuits connected with these valves.

With the help of these two new technicians, it is hoped to correct the problem earlier than expected, and thus to avoid the cooling of the reactor and the consequent absolute shutdown. In that case, the later startup would entail losses to the company of at least 100 million pesetas.

The bulk of the 11 shutdowns at Asco II since last March have been caused by defects in the mechanism that automatically effects the opening and closing of valves VN-3042, VN-3046, and VN-3050, manufactured by the now defunct U.S. firm, Teledyne; responsibility for these components has been taken over by another U.S. firm, Paul Monroe.

The failures in this mechanism led to the later discovery of anomalies in the safety system. Because of this failure, the closure time of the valves which shut off radioactive steam was almost 1 minute, instead of 10ths of a second, as it should be.

The Asco II nuclear power plant is now in a status technically described as "mode four," which is a "hot shutdown." If the plant remains inactive much longer, the reactor will begin to cool down. Then the shutdown would be a "mode five," which is equivalent to a "cold shutdown."

Based on what DIARIO 16 has been able to learn from sources close to the plant management, the main reason for the presence of the American technicians is to accelerate repairs of this defective valve-control mechanism, for if the problem is not corrected within the next few days, the plant will have to begin the "cold shutdown" procedure. Its later startup would then be much slower, causing greater economic damage to the company in productivity losses.

After the impact and repercussions which this failure has had in recent days, normality again returned yesterday to the management of the nuclear complex. In the meantime, DIARIO 16 has found that Asco's neighbors have been somewhat astonished by the uproar that the latest problems at the plant have awakened in the communications media. Many of the nearby residerts had not been much concerned about everything that has been happening at Asco.

According to DIARIO 16's information, the three technical experts sent to the complex by the Nuclear Safety Council are maintaining complete silence about their report. It is quite possible that this report will not be completed until the middle of next week. Then it will be sent directly to the full council.

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MINISTER REPORTS ON RADIATION LEVELS

Istanbul TERCUMAN in Turkish 5 Jul 86 p 3

[Text] Ankara -- Minister of Industry and Trade and Turkish Radiation Security Committee Chairman Cahit Aral stated, "Measurements are taken twice a day in Turkey. Atmospheric radiation levels range between 6 and 14 microroentgens per hour. This is the normal level of radiation existing prior to the Chernobyl accident."

Minister of Industry and Trade Aral said in a statement made on this subject:

"The Turkish Radiation Security Committee has held two meetings. Representatives from various ministries and organizations also participated in these meetings. The World Health Organization has set 2,000 becquerels per liter as the upper limit acceptable from the standpoint of human health for milk and milk products. The maximum acceptable radiation level established by the International Atomic Energy Agency is 1,000 becquerels per liter while that of Atomic Energy Agency member nations is 370 becquerels per liter. The latter accept 600 becquerels per kilogram as the highest radiation level allowable for meat, vegetables, and other foodstuffs. It has been determined that radiation existing in meat, milk, milk products, vegetables, and fruit in Turkey is far below Atomic Energy Agency limits. As was pointed out previously, radiation levels of our water, milk, vegetables, fruit, and grains present absolutely no health hazard. Our committee is monitoring the actions on this subject of other nations and international organizations. Groups of specialists are being organized in order to establish measures to be taken to prevent radiation contamination that could occur in the future as a result of accidents.

"The Turkish Atomic Energy Commission is the only agency with the authority to issue 'radiation-free' certification in behalf of our committee for food imports and exports."

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